# FOOD MANUFACTURE

*Incorporating Food Industries Weekly*

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Department of Food Technology
University of Massachusetts
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**The expert knowledge of Mr. Helmut Hilgeland on all phases of sausage-making, meat curing, canning and factory layout binds the Foodtech Service into a complete whole. Mr. Hilgeland is always glad to give advice. All enquiries are treated as personal and confidential and should be addressed to Mr. Hilgeland, Managing Director, Foodtech Limited, at the address below.**

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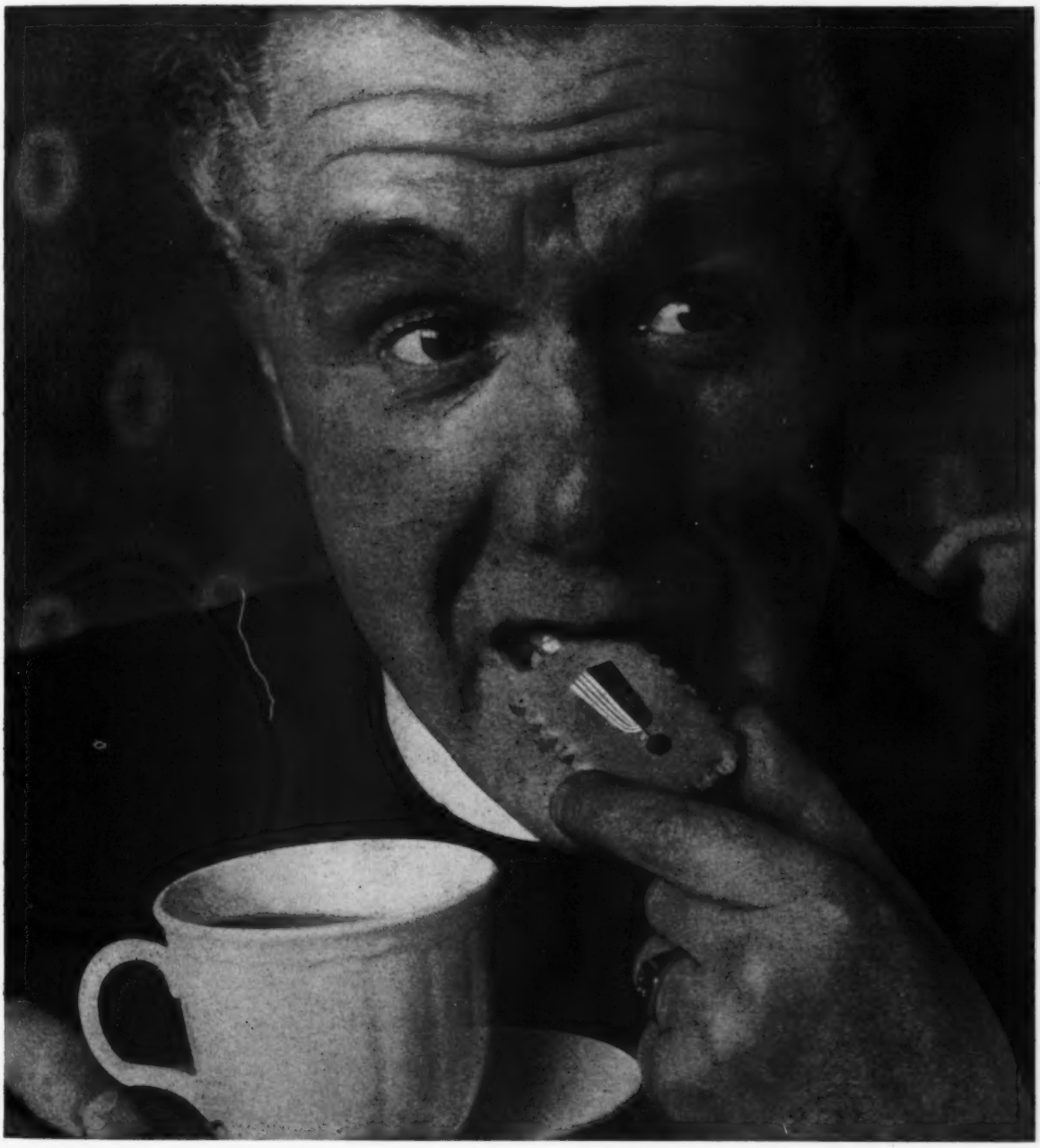

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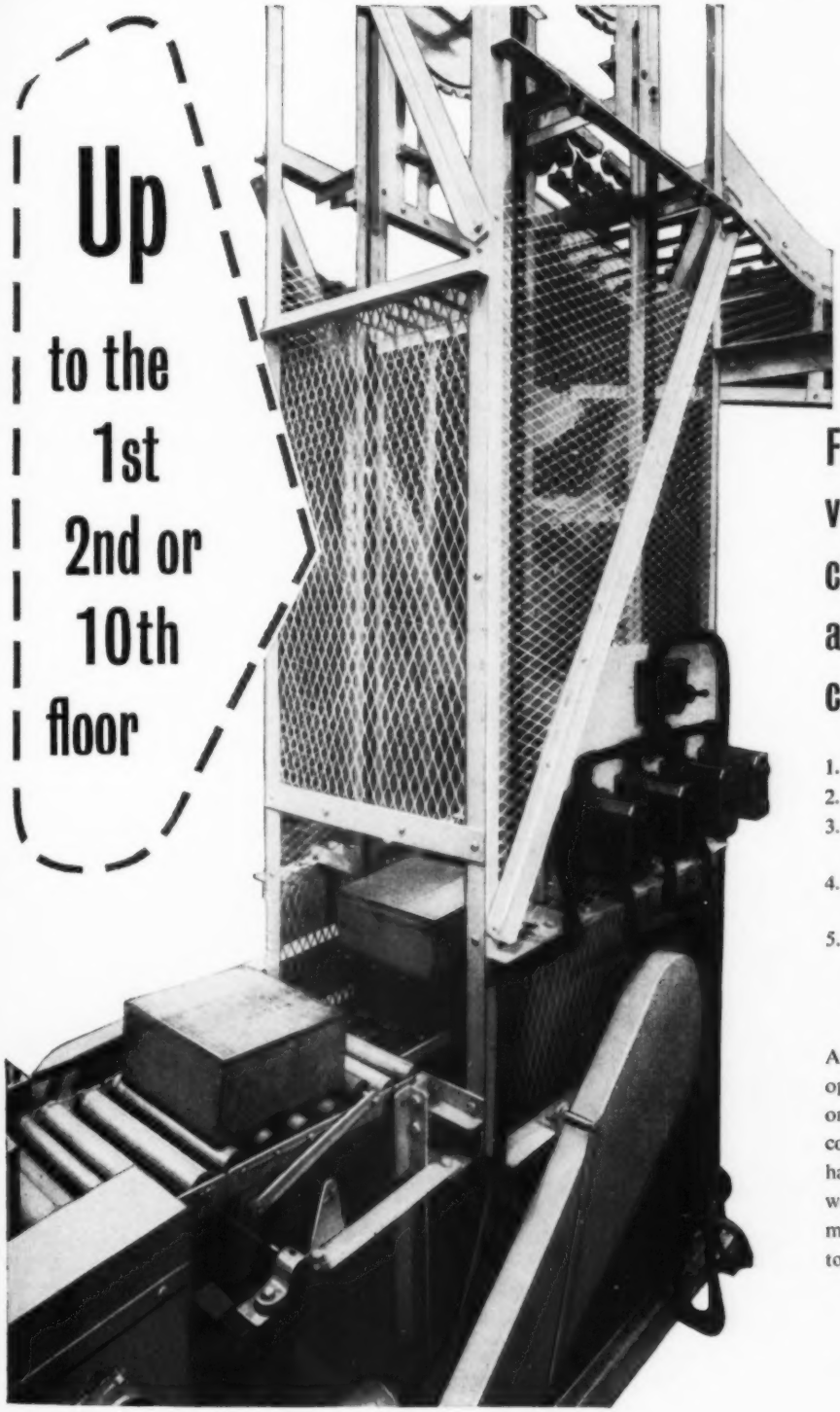


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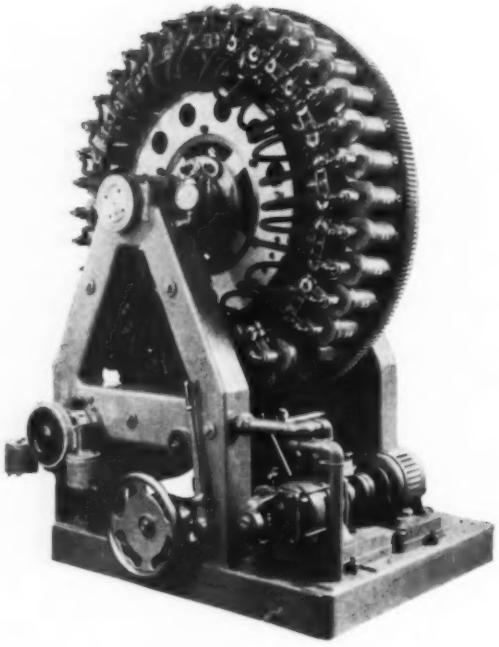

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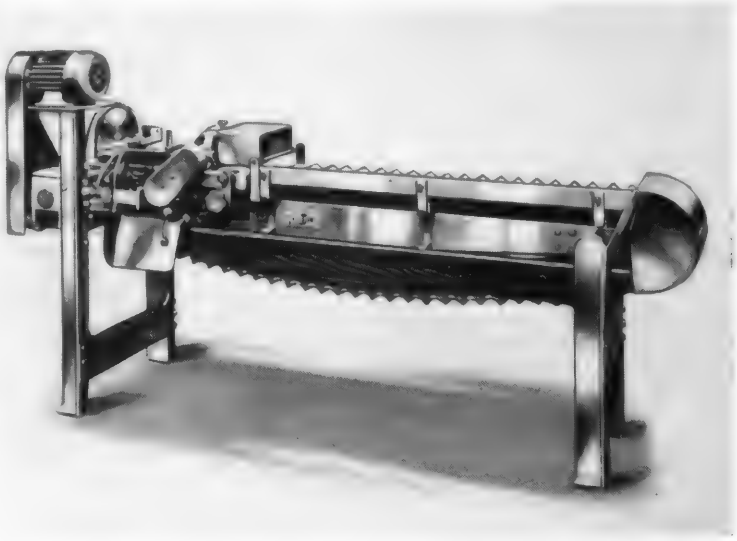

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The conveyor belt is made of steel bolt chain with riveted galvanized slats or netting. Power is provided by an electric motor (3 h.p.).

The machine is equipped with friction coupling and protective motor switch which begin to function if the machine is accidently overloaded, thus preventing wear and tear of machine parts.

When the herring is emptied into the washing vat, an adjustable device forces it under water and up onto the conveyor belt. Here it is rinsed and then collected in a silo at the end of the belt. All scales are conveyed in water troughs to a vibrating screen leading to boxes in which the scales are collected. Operation of the machine is extremely simple.

The "P.P." herring washing machine can be supplied in several sizes.

World Concessionaires Arenco Ltd.

**ARENCO LIMITED** 4 CARLISLE AVENUE, Fenchurch Street, London E.C.3.

Telephone: ROYAL, 1693

Telegrams: ARENCOMEK, FEN, LONDON

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**WITH CHOICE OF PETROL OR DIESEL ENGINE**

**NORMAL CONTROL VAN**
185 cu. ft. capacity
ALSO AVAILABLE

- *Robust four-speed synchromesh gearbox.*
- *Fully-floating spiral bevel rear axle.*
- *Exceptional visibility and manoeuvrability.*
- *Smooth-ride suspension, hydraulically damped.*
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are made in horizontal or vertical designs for land and marine service. They are suitable for driving oil or water pumps, fans or other machinery. We invite consultation on the most suitable design to meet specified requirements.

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CATHCART · GLASGOW

*Weir Products include:*
**FEED PUMPS · FEED HEATERS · OIL FUEL PUMPS · FEED REGULATORS**
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***Two heads are better than one . . . so send that flavouring problem to the***

# BOEHM EXPERIMENTAL KITCHEN

As acknowledged experts in the field of food flavouring it is possible that we have the answer to your immediate flavouring problem. If not, the Boehm Experimental Kitchen will get to grips with it and do its best to find a solution. This service is absolutely free and, needless to add, is becoming more and more popular with manufacturers. Incidentally, many products today owe a great deal to the shrewd advice and technical help of Fredk. Boehm Ltd. Why not put your problem in the post to them NOW?

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**AJI-NO-MOTO**
Mono-sodium glutamate 99% pure.

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Autolysed Yeast Extract.

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Hydrolised Protein.

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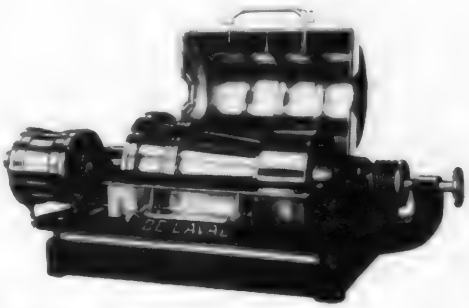
# When considering SEPARATION PROBLEMS

# Think of DE LAVAL first!

With over 150 Current models of Centrifugal Separators to choose from and backed by over 75 years experience in their application De Laval can offer you the best advice and the widest range of equipment.

for CONTINUOUS
LIQUID/LIQUID
LIQUID/SOLID
LIQUID/LIQUID/SOLID
Separations



**DE LAVAL DESLUDGER**

A Horizontal centrifuge with helical Screw for the continuous Separation of Solids from a Liquid.

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An entirely new high capacity Hermetic Clarifier. Complete freedom from air contact enables gaseous liquids to be processed.

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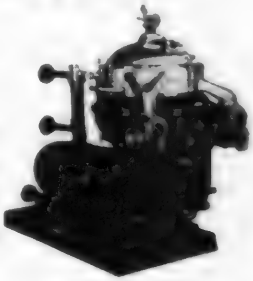
High efficiency disc type Separator—Discharges solids automatically while running at full speed—Cuts out bowl cleaning —reduces labour.

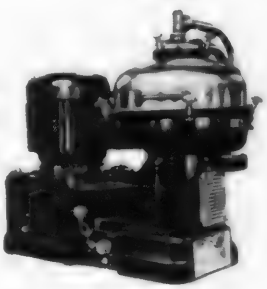


**DE LAVAL HERMETIC SEPARATOR SSG 409**

A Hermetic Separator for oil degumming or soapstock separation as used in the De Laval Short Mix Refining Process.

**DE LAVAL NOZZLE SEPARATOR QX 212**

For continuous discharge of solids in Liquid/Solid separations. High capacities up to 20,000 g.p.h.



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Think of **DE LAVAL** first for your heat-exchange and pumping problem—**DE LAVAL** Stainless Plate Heat Exchangers & Easy-Clean Centrifugal Pumps are the answer

**PROCESS ENGINEERING DIVISION**
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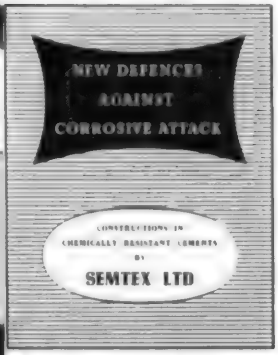


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# Equipment blameless if . . . Stainless

STAINLESS STEEL EQUIPMENT is now *de rigeur* industrially for all those storage and processing jobs in which spotless conditions must be preserved . . . which immediately brings to mind dairies, breweries, and food factories.

Butterfields produce Tanks, Vats, Pressure and Vacuum Vessels, Mixers, Tilting and Boiling Pans, Trolleys, Troughs, etc., etc., in Stainless Steel, to the specifications of Works Engineers. Butterfield workmanship does full justice to this fine material.

ABOVE: *A Stainless Steel Syrup Mixing Pan with stirring gear.*

**for storing processing and refining**

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# LIQUID PROCESS CONTROL

## *buttoned up by*

## MEASUREMENT

Batch control for a liquid mix nowadays requires precise amounts of several ingredients to be dispensed in exact quantities. Too often this job still depends on a man with a bucket and a mind of his own. MEASUREMENT have replaced this uncertain method with a system of metered control. The quantities are pre-set on a dialled control panel and supplied to the mix, from a remote control point if necessary, at the press of a button. Quantities are precise, records are automatic, control is complete and the bucket is out.

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**EXPORT ENQUIRIES TO:** Parkinson & Cowan Group Exports Ltd.,

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**a LAMINATION** is made by bonding together with adhesive two or more layers of different materials. The moisture-proofness of one may be joined with the strength of another and the appearance of a third. Variations can be made in relative thickness, and the possibilities are both numerous and exciting.

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**BATCHELORS**
USING
**TRIPOLAM X**
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***Aluminium foil x paper x aluminium foil—moistureproof, strong, rigid, heatsealable, non-toxic, capable of being printed in multi-colour and/or embossed.***

**Ask about other Metal Box laminations**

MB 52/01

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WITH UGB GLASS CONTAINERS

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*The Closure Division of The United Glass Bottle Manufacturers Ltd*

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# THE STEEL COMPANY OF WALES LIMITED

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★ Packed in easily handled cartons

**PROMPT DELIVERY FROM STOCK**

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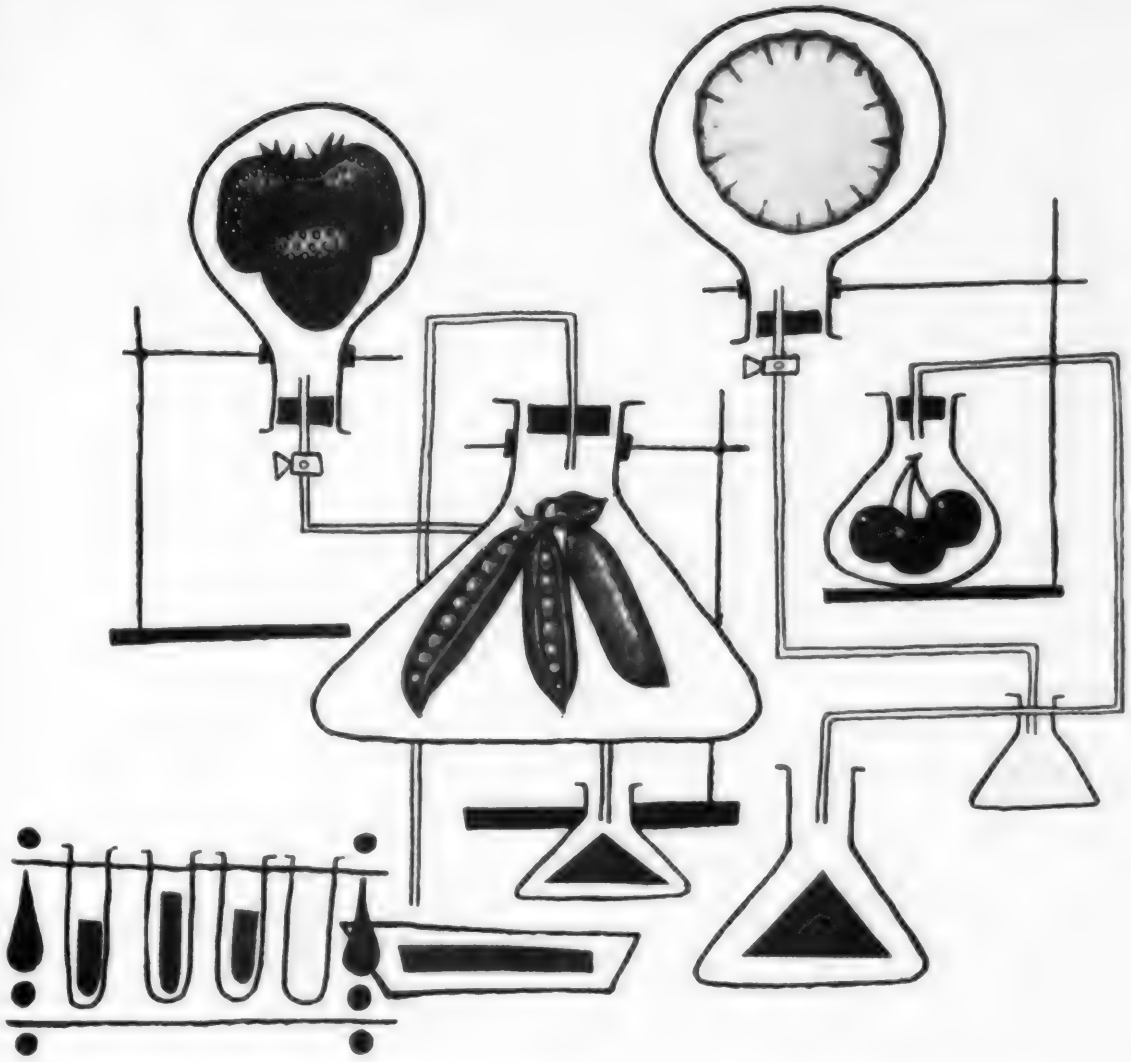

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## FOR FRUITS AND VEGETABLES

*Edicol Supra Colours meet the highest standards of purity demanded by the most stringent regulations in the world.*

*Their purity is protected by delivery in sealed package.*

*"Certified" supplies of many are available for food processors exporting to the United States.*

*Technical literature and full information on request*

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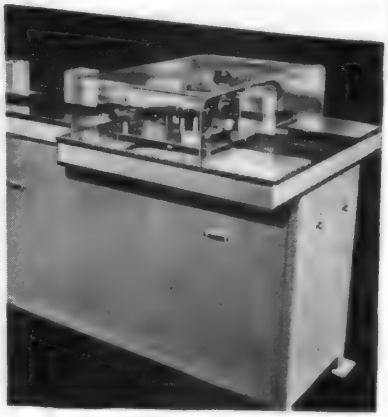
D.523

'Scotch Boy' No. 600 cellulose tape

# 'SCOTCH' BOY TRADE MARK TAPES

***do the job BETTER!***



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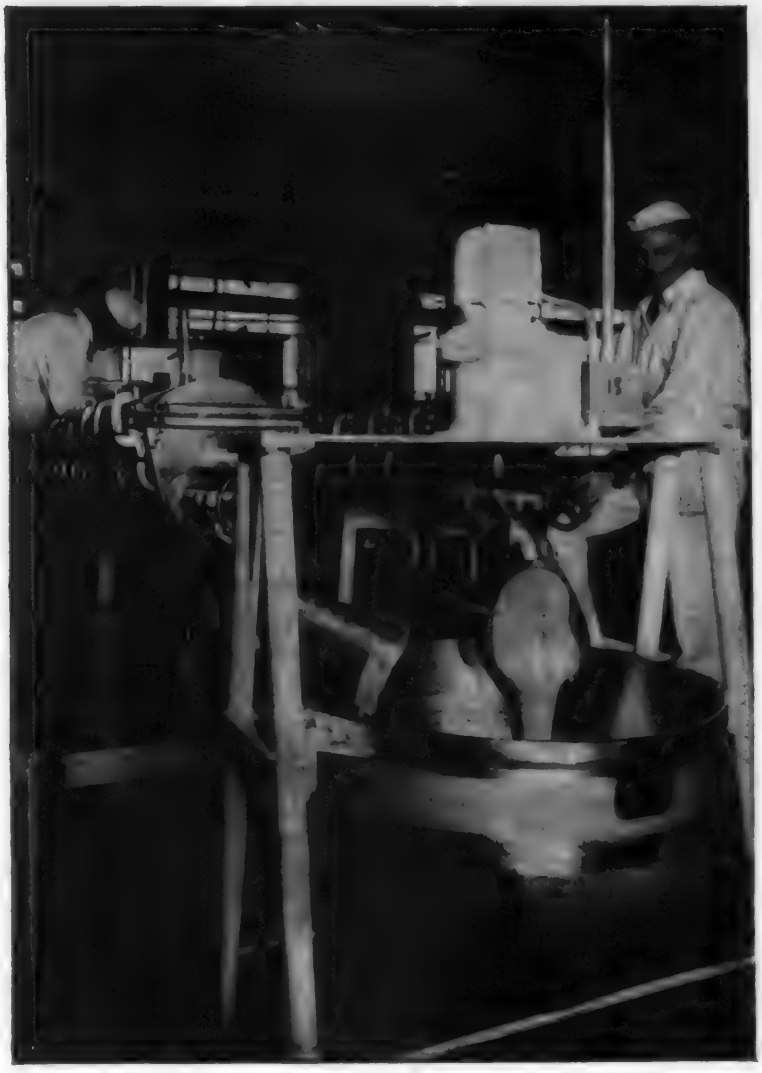

"SILVER FOX"

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STAINLESS STEEL

## . . . *safeguards your health*

In the preparation of foodstuffs, scrupulous attention to cleanliness is essential. That is why this modern plant for the production of cheese makes extensive use of stainless steel for all metal parts in contact with the product. Freedom from contamination and ease of cleaning are two of its main advantages.

*Burnett & Rolfe Cheese Cookers, photographed in natural colour by courtesy of Kraft Foods Ltd., Hayes, Middlesex.*

*The metal of the age*

THE UNITED STEEL COMPANIES LTD

SAMUEL FOX & COMPANY LIMITED

*A Subsidiary Company of The United Steel Companies Limited*

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F384

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# HYDRAULIC & ROTOR JET CLEANERS
# STAINLESS STEEL EQUIPMENT

SYMBOLIZES
"CLEANING IN PLACE"

C.P. are specialists in exclusive continuous and batch processing plants, highest standard stainless steel fabrications and equipment for production where controlled heating, cooling, mixing and aeration are essential.

**PLATE HEAT EXCHANGERS**
**CAPACITIES to 10,000 Imp. Galls. per hour.**

Incorporating patented detachable seals with flat unstressed stainless steel heat exchange plates. Specially developed to give the most efficient heat exchange without tracking at low pressures. The Plates and Seals are mounted in either a stainless steel or mild steel frame, permitting easy and hygienic cleaning manually or in situ.

**STAINLESS STEEL PROCESSING VATS.**
**CAPACITIES 50-1,000 Imp. Galls.**

For storage, heating, mixing or pasteurising liquid products, with a wide range of agitators and emulsifiers. Thermostatic control and scientific insulation enables temperatures to be maintained over long periods accurately and economically. Special types designed and made to requirements.

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An exclusive feature being the patented single service expendable valve for ultra fine dispersion at low working pressures.

**CONTINUOUS PLASTICISERS AND MARSHMALLOW PROCESSORS CAPACITIES up to 4,000 lb. per hour.**

Developed most successfully for heating, cooling, blending and mixing various materials including viscous products such as caramel, sugar compounds, creams, etc.

**IN-LINE FILTERS (3" & 6" DIAMETER)**

Capacities up to 1,000 Imp. Galls. per hour according to product. Available completely in stainless steel if required.

**SABROE SOFT-ICE MACHINES with capacities up to 1,500 lb. ice per hour, also SCALE ICE MACHINES with capacities up to ½ ton per hour.**

Providing continuous supply of chilled water at 33/34°F. under peak loads, or alternatively supplies of soft ice without modification. The machines operate on minimum power over spread hours at the lowest cost.

**CENTRIFUGAL PUMPS**

Made in finest corrosion resistant stainless steel with rotary seal eliminating gland packing. Capacities of these universally used pumps are up to 2,400 Imp. Galls. per hour at 24 ft. head. A perfect pump at the lowest cost.

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An extremely efficient stainless steel filter with output up to 3,000 Imp. Galls. per hour and over, dependent on product. Supplied as single or duplex units.

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These are specially designed units for maximum heat recovery and fuel economy purposes.

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**Why not take advantage of the C.P. Specialized Consultancy and Advisory Service without obligation.**

Expert advice by technicians is given on all aspects of processing plant, equipment and cleaning problems.

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(Formerly The Creamery Package Mfg. Co. Ltd.)

MILL GREEN ROAD · MITCHAM JUNCTION · SURREY

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FINE CITRIC ACID IN THE MAKING

# Off with its head

Revolt lurks perpetually in our new artist's breast. His desire for innovation shows itself in eccentricity of dress, habits and outlook on industry. Admittedly he never yet had a picture hung upside-down — he generally manages to turn his subjects inside-out. Show this latest effort of his to a psychiatrist, mention artistic licence and horse mania in passing, and the psychiatrist would see at once that the drawing clearly represents a stage in producing Sturge citric acid.

As molasses is converted into acid-containing liquor by fermentation a felt of mould is also formed and when the optimum amount of citric acid has been produced this 'head' is removed. The felt contains an important Sturge by-product, ergosterol, the starting material for the synthesis of Vitamin D2.

*Manufacturers of fine chemicals since 1823*

**STURGE**

**CITRIC ACID BP**

**CITRIC ACID ANHYDROUS**

**JOHN & E. STURGE LTD · WHEELEYS ROAD · BIRMINGHAM, 15 · TEL: MIDLAND 1236**


[c]

# Over 75% of margarine produced in Great Britain . . .

*Photograph by kind permission of the Swedish Co-operative Wholesale Society, Norrköping*

## is processed by

# ★ Votator

## CONTINUOUS PROCESSING APPARATUS

## *Here are the reasons why*

- **Requires only a fraction of the staff to give similar output.**
- **Margarine is untouched by hand, from emulsion to ready packed product.**
- **Each three-cylinder machine has through-put rates from 2 to 3 tons per hour, requiring virtually no supervision.**
- **Product is superior in texture and flavour—with unvarying uniformity.**

Not only can we call on our own vast experience but we are backed by Girdler's 30 years experience in the U.S.A. Votator Apparatus incorporates an exclusive, patented heat-transfer mechanism. Revolving scraper blades constantly expose a clean heat-transfer surface to the incoming material. A clean heat-transfer surface combined with a high ratio of surface-to-volume of material being treated, gives the finest results.

**PILOT PLANT SERVICE**

Enlist the services of our Technical Department and fully equipped Votator Laboratory for developing new applications or improving existing ones for the heating, cooling or crystallising of viscous or liquid materials by closed-processing plant.

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**A. JOHNSON & CO. (LONDON) LTD.**

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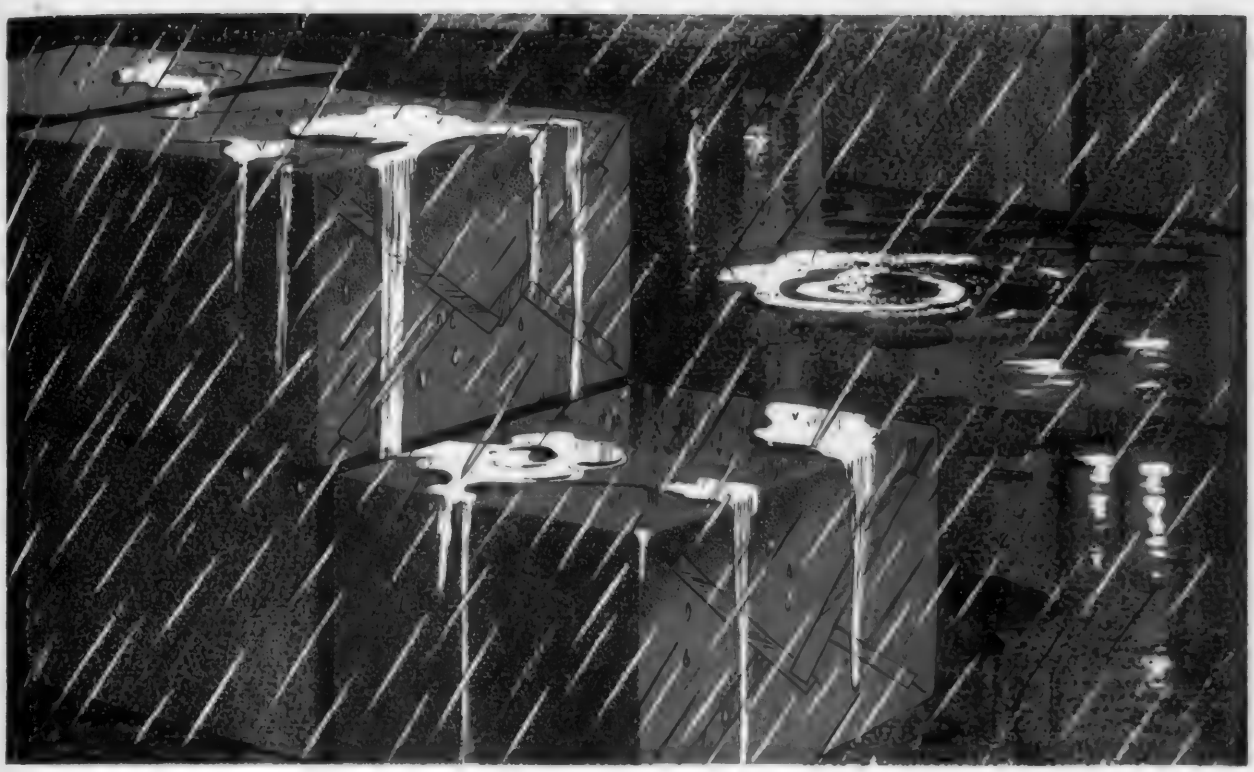
*Telegrams:* **Agenticum Telex London.** *Head Office:* **Africa House, Kingsway, London, W.C.2**

★ *"Votator" is a trade-mark which applies only to the products of the Girdler Company or their licensees.*



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**Let Telcothene protect your product**
Then you know it's safe from dirt and damp. Safe from chemical contamination. Safe in bad storage conditions. Safe for a long, long time. You know it will be factory fresh the day it's opened.

**Telcothene Coated Papers**
make the perfect packaging for foodstuffs and perishable goods. They are non-toxic, moisture-proof and tough. Suitable for multiwall paper sacks, drums and cartons.

**The cost is low**
Weigh the price of Telcothene Coated Paper against the results in terms of customer goodwill, prestige, and lengthened product-life, you'll realise how low the cost is.

**Look into this Telcothene business.**
The people who developed it are the people to prescribe its place in your packaging department. Their advice is free; write for it.

# ..it's Telcothene packed!

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# What did the Works Manager do who advertised–

## SMART GIRLS WANTED?

He added smartness of appearance to their smartness of ability by seeing they were supplied with Remploy overalls. And everyone was happy!

Smart, perfectly made clothing means a lot to womenfolk in factories. It gives them a happy feeling of 'belonging', that they are being looked after—and they respond accordingly in ready co-operation.

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All materials used in Remploy Industrial Clothing are guaranteed top quality, preshrunk, and in fast-dyed colours. Lancashire cloth is always used.

For warehouse coats, boiler suits, all types of industrial clothing for all purposes, Remploy is the name to remember.

*Remploy* **INDUSTRIAL CLOTHING**

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Oxgate Lane, Cricklewood, London, N.W.2
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**To REMPLOY LTD. (Industrial Clothing Division) Oxgate Lane, Cricklewood, N.W.2**

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| WAREHOUSE COATS | ☐ |
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Please send full details of the Industrial Clothing marked here with a tick.

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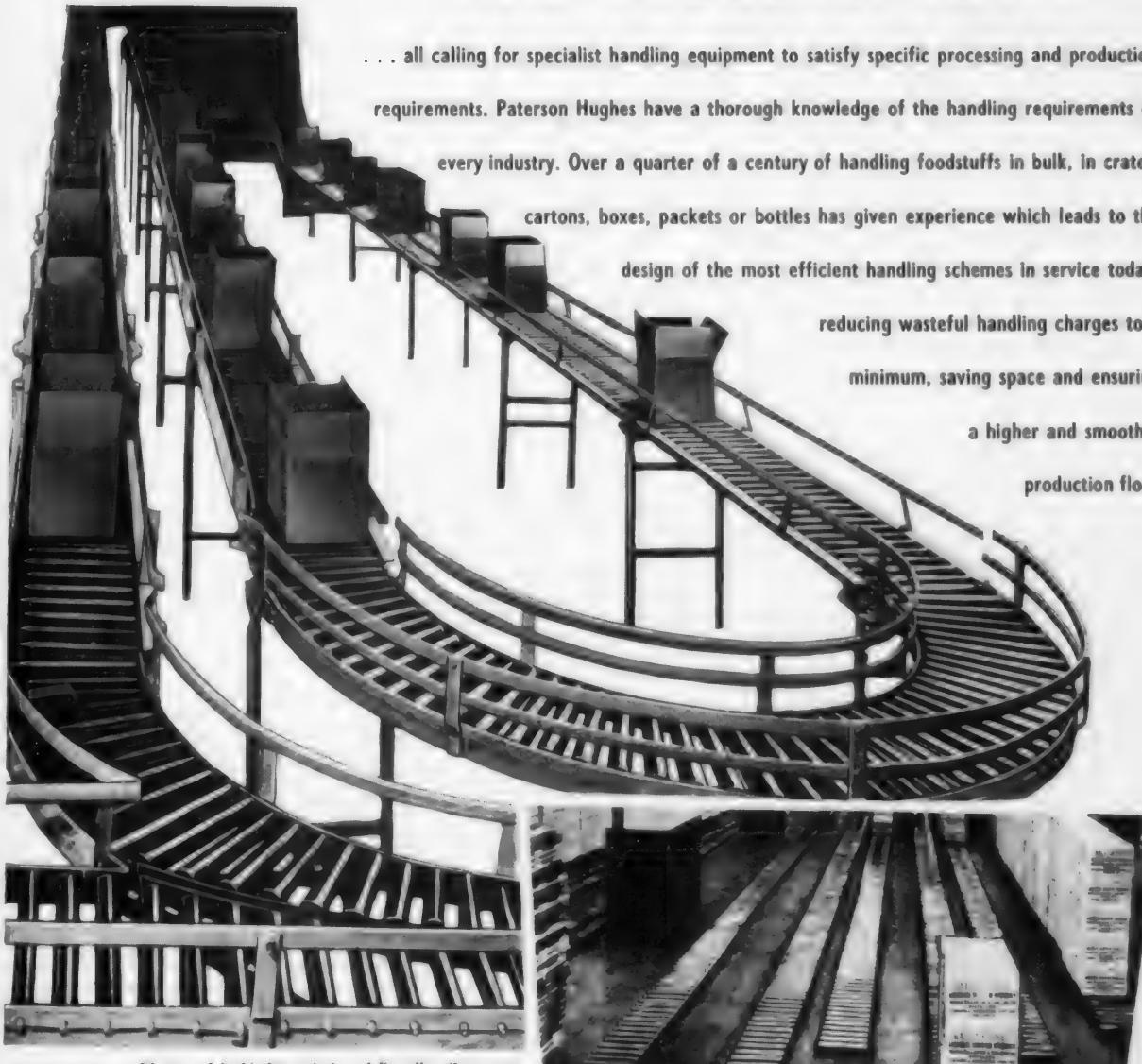
# There are Foodstuffs and Foodstuffs....

. . . all calling for specialist handling equipment to satisfy specific processing and production requirements. Paterson Hughes have a thorough knowledge of the handling requirements of every industry. Over a quarter of a century of handling foodstuffs in bulk, in crates, cartons, boxes, packets or bottles has given experience which leads to the design of the most efficient handling schemes in service today, reducing wasteful handling charges to a minimum, saving space and ensuring a higher and smoother production flow.



*Photograph by kind permission of Rowallan Creamery Ltd., showing Gravity Roller handling Margarine*

*Gravity rollers handling Liqueur Scotch Whisky: photograph by kind permission of George Ballantine and Son Limited*

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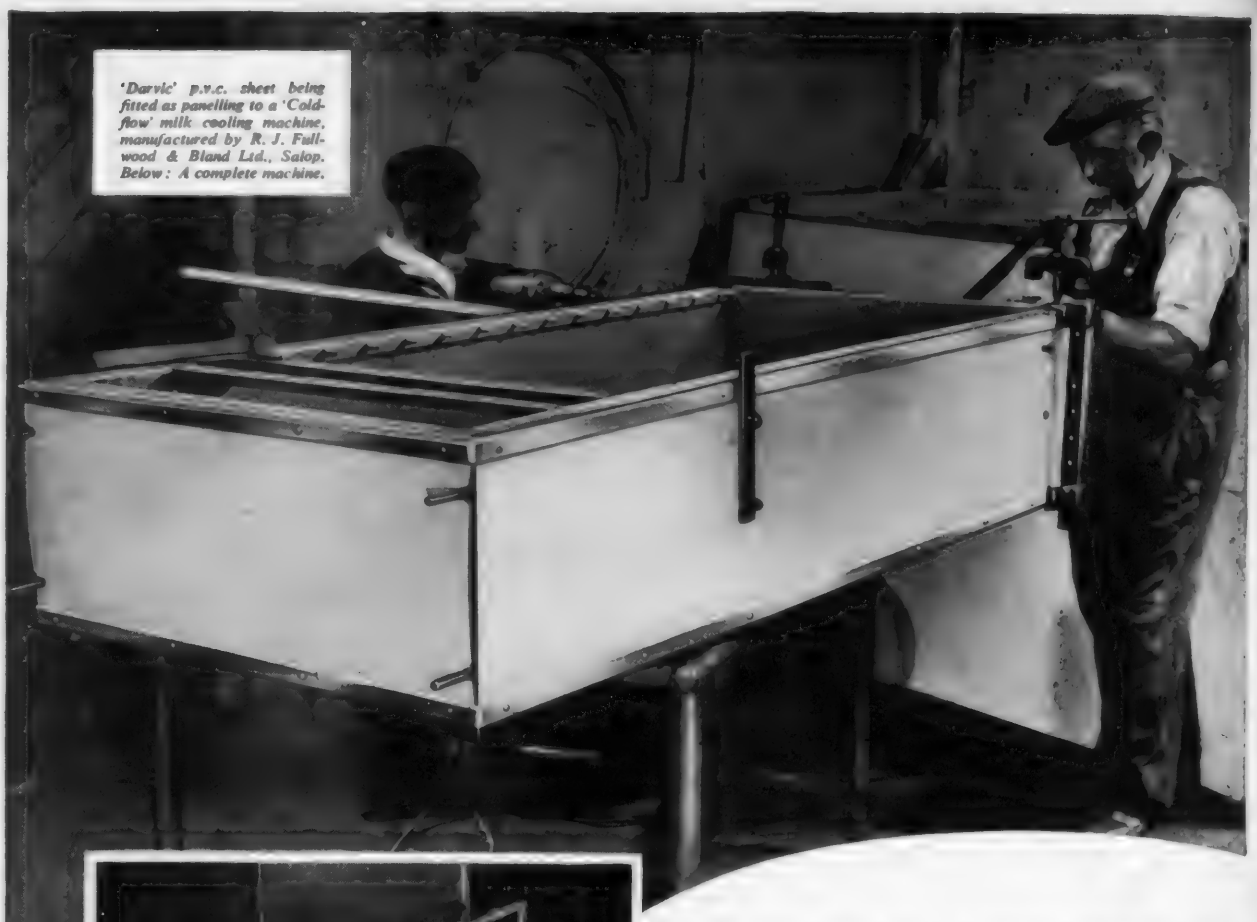

*'Darvic' p.v.c. sheet being fitted as panelling to a 'Cold-flow' milk cooling machine, manufactured by R. J. Fullwood & Bland Ltd., Salop. Below: A complete machine.*

# STRONG HYGIENIC 'DARVIC' IS THE MODERN MATERIAL FOR THE JOB

'DARVIC' p.v.c. sheet, manufactured by I.C.I., is the ideal material for fittings and containers used in the handling and processing of food. It is odourless and does not taint food or drink. 'Darvic' is easy to clean, light, tough and long-lasting.

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**'DARVIC'**

*'Darvic' is the registered trade mark for the rigid p.v.c. sheet made by I.C.I.*

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**25 lines**

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**SOUTHWARK STREET, LONDON, S.E.1**

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**No handling, no bags,**
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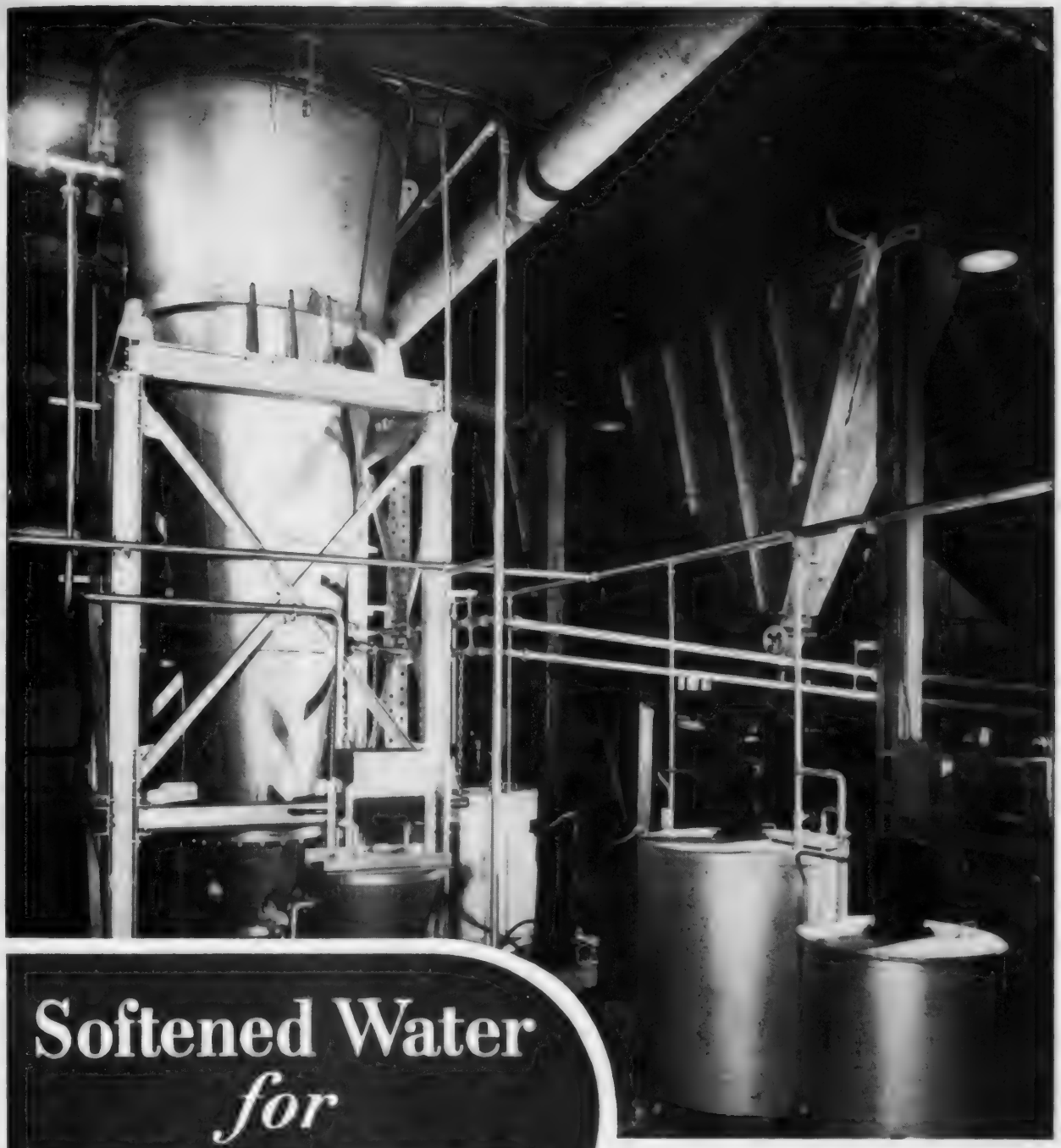

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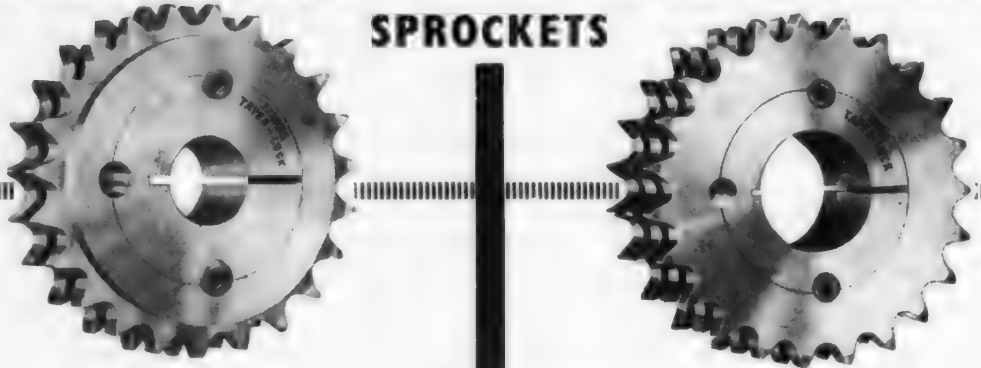

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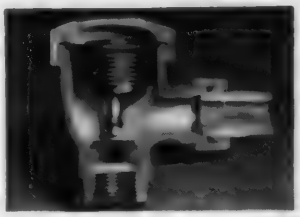

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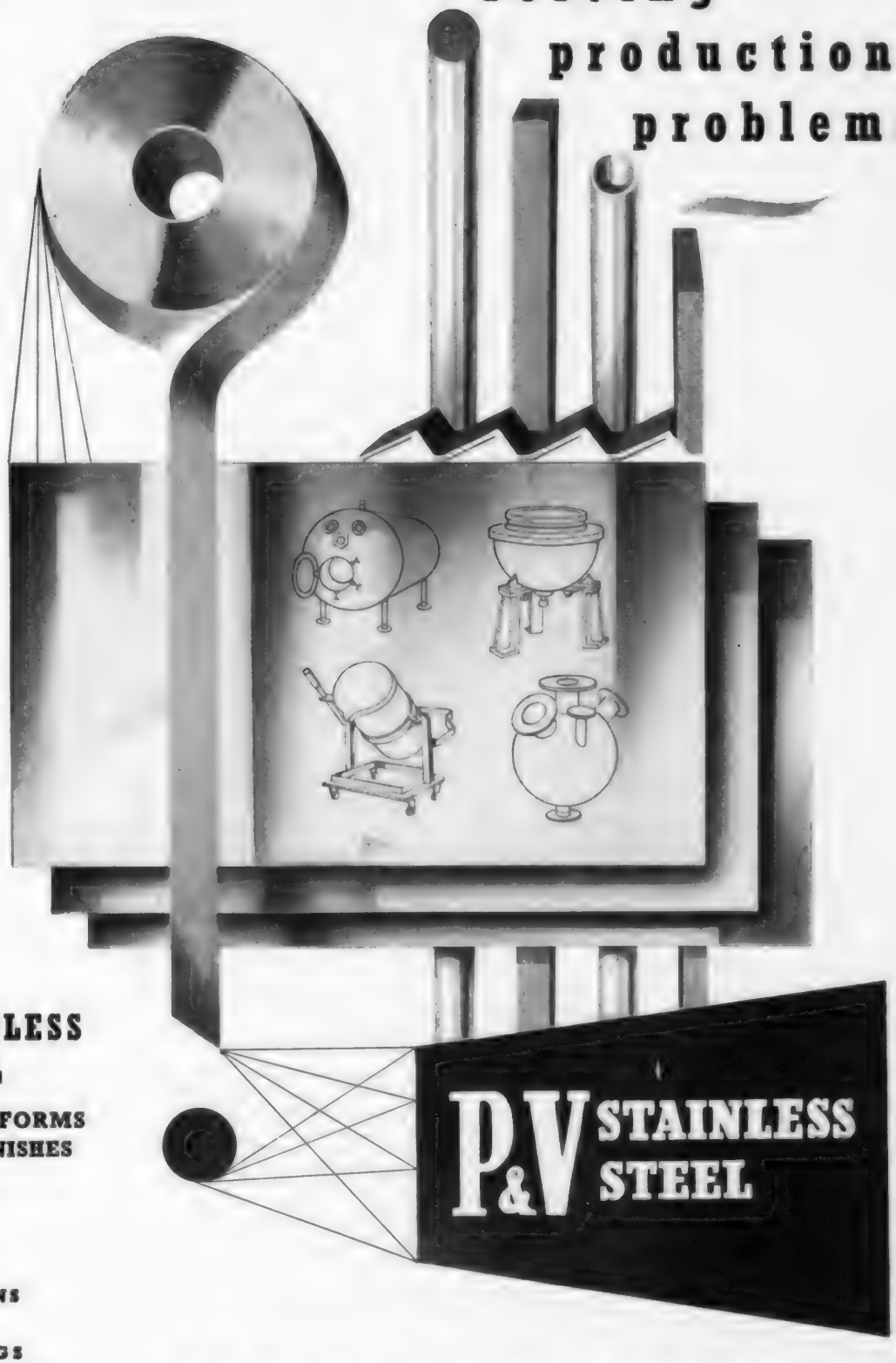


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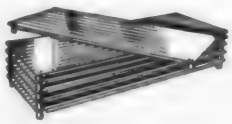

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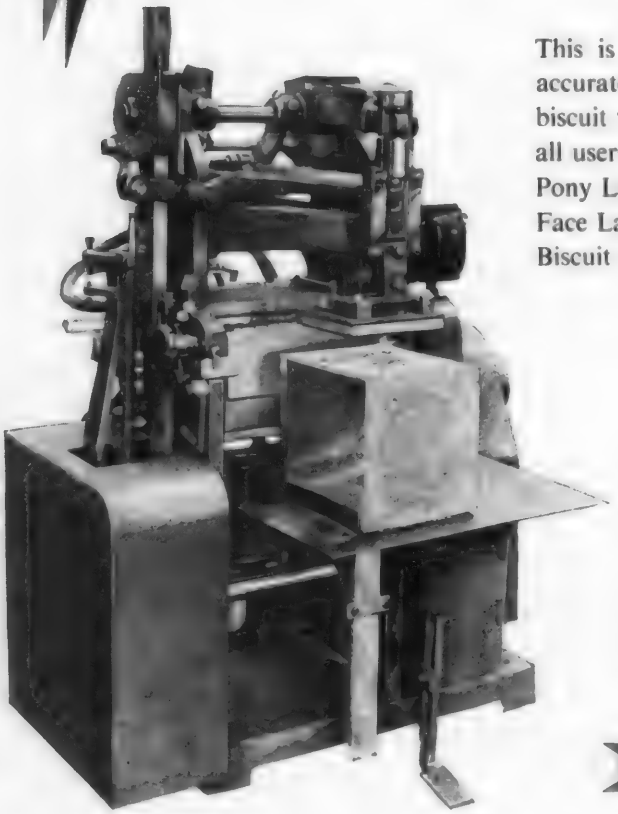

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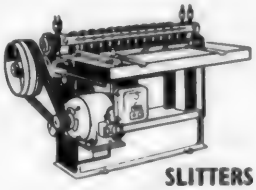

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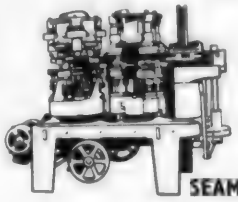

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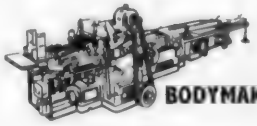

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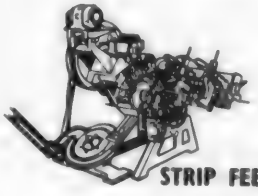

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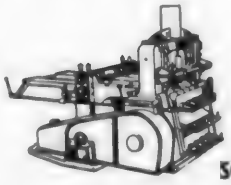

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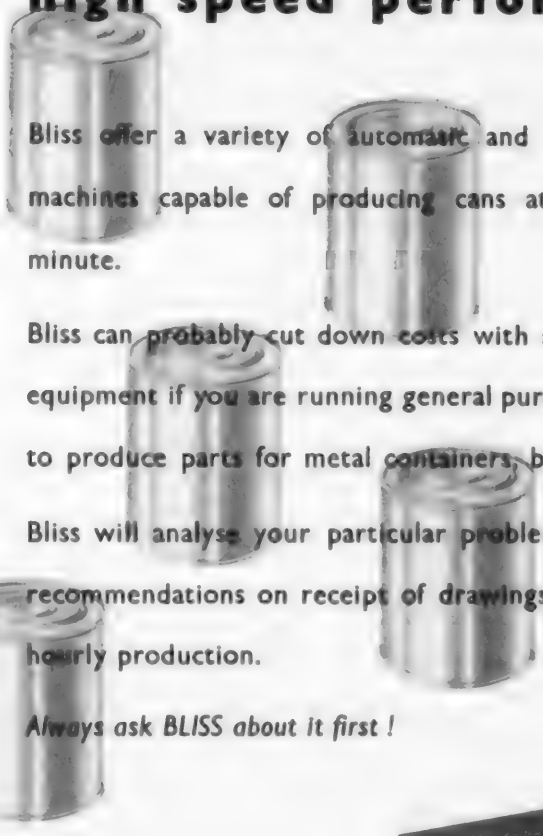

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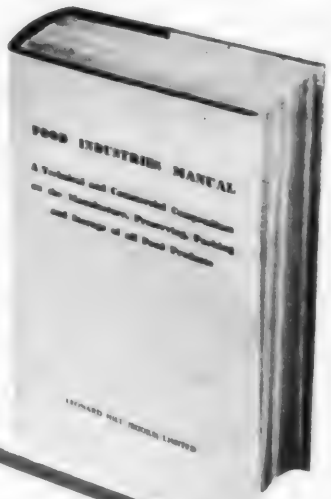


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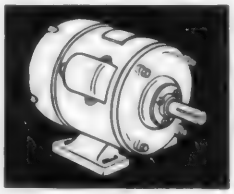

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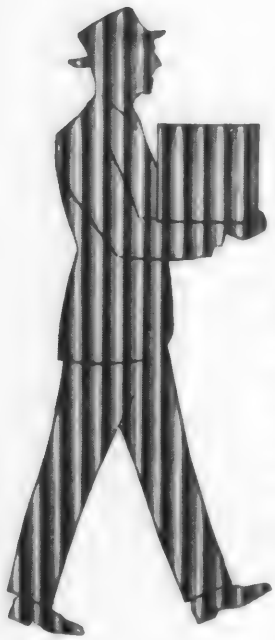

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We have had much experience of fats at CBC and our knowledge is at your disposal. In addition to our standard range, we can supply special fats for particular requirements. If you want any information, at any time, just get in touch with our Sales Director.

***Whatever you produce . . .***

*. . . ice-cream, biscuits, pastry or cakes of any kind, there's a CBC fat to meet your exact requirements.*

**Get your Fats and your Facts from** CBC

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CCT 60-5-120

# VENTILATION *AND* FIRE PROTECTION!

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GRAVITY OPENING LOUVRES
FUSIBLE LINK.
STAINLESS STEEL TENSION SPRING, KEEPS LOUVRES CLOSED WHEN NOT IN USE.
LOUVRE OPENING SPRING.
CABLE CONTROL PULLEY FOR NORMAL VENTILATION USE OR FOR TEST OPERATION.

## with the COLT DUAL PURPOSE FIRE VENTILATOR

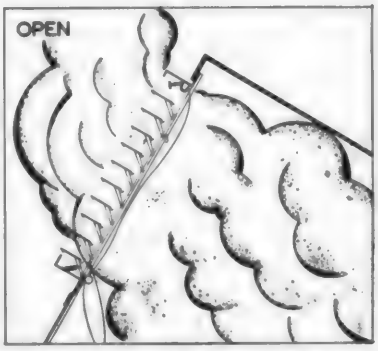
### at AC-Delco, Division of General Motors Ltd., Southampton.

A study of industrial fires in Great Britain and in America has shown that the primary cause for the spread of fire is the super-heated air, smoke and explosive gases trapped under the roof. They build up in heat and intensity from the fire below and cause flash fires. Furthermore, the smoke rapidly extends downwards, entirely filling the premises and preventing the work of the fire fighters.

Colt have successfully solved this problem with the design of the Dual Purpose Fire Ventilator which **provides ventilation during normal conditions and—in the event of fire—functions as a heat and smoke exhaust.**

The installation of heat and smoke exhausts is standard practice in America and is rapidly being adopted by leading industrialists in the United Kingdom. Already, 1,290 Colt Dual Purpose Fire Ventilators have been installed in General Motors buildings in this country.

***Write to Dept. V.9/6 for paper " Some Aspects of Fire Prevention in Industrial Buildings " by M. J. Reaney, which deals fully with this matter.***




*The insets illustrate the action of the ventilator as a Heat and Smoke Exhaust. In the event of fire, the fusible link fuses, providing Automatic Escape for Super-Heated Air and Smoke.*

**COLT VENTILATION**

COLT VENTILATION LTD · SURBITON · SURREY

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*U.S.A. Subsidiary: Colt Ventilation of America Inc., Los Angeles.*

*Branches at: Birmingham, Bradford, Bridgend (Glam.), Bristol, Coventry, Dublin, Edinburgh, Glasgow, Liverpool, London, Manchester, Newcastle-upon-Tyne, Sheffield, and Warwick.*

*Agents in: Australia, Belgian Congo, Canada, Cyprus, India, Indonesia, Madagascar, Malaya, Mauritius, New Zealand, Pakistan, Portugal, North and South Rhodesia, and South Africa.*

G579

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We make Stainless Steel Plant—and we make it *to fit the job*. We will work to your specification, or prepare designs without obligation. May we send you literature, illustrating work we have done in widely differing industrial fields—nearly all of it 'tailor-made'?

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This 50-gallon Boiling Pan is designed for a working pressure of 60 lbs. per square inch; our name and test-plate will vouch for careful design and acceptance by any British Insurance Company. Similar Pans are available in capacities from 20 to 200-gallons, either tilting or fixed type. The 50-gallon size is available from stock. Write to us for further details.

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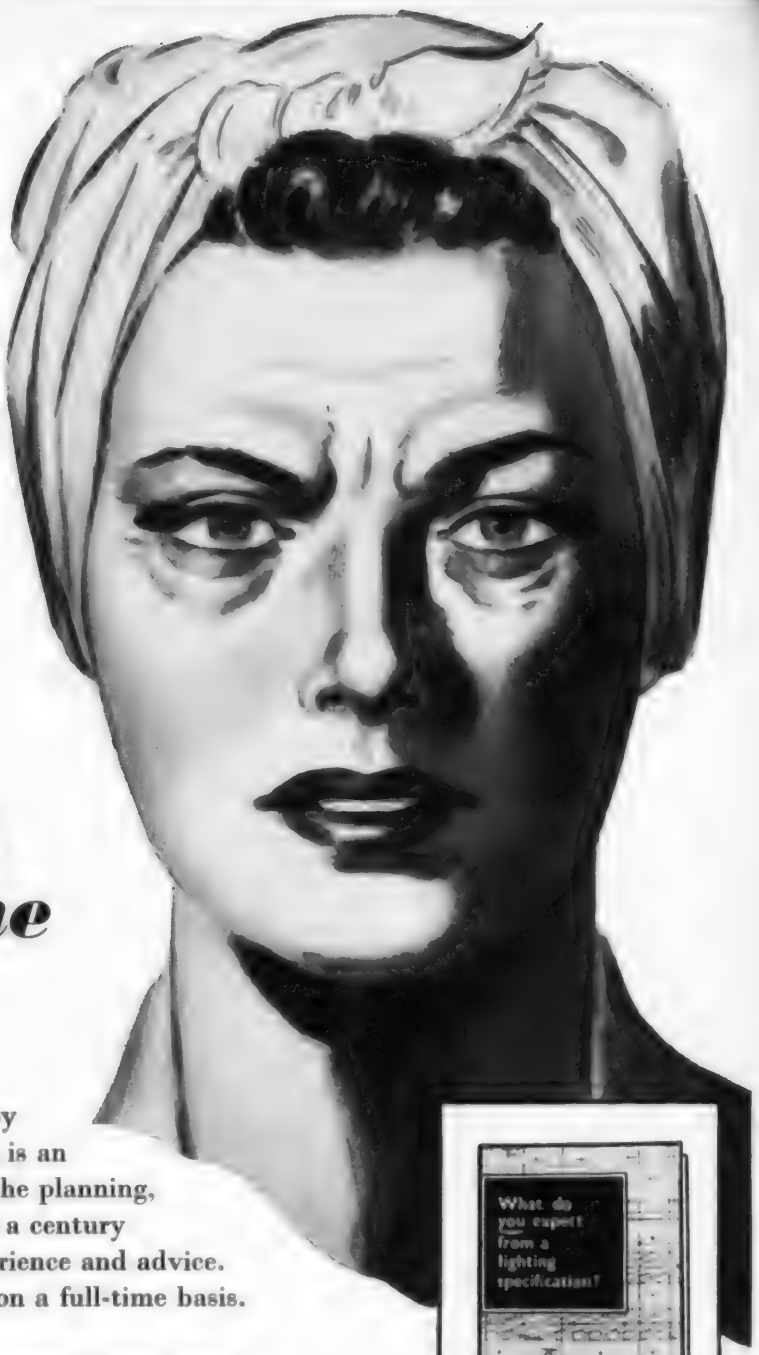

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**The Benjamin Illuminating Engineering Service brochure, shown opposite, describes how our lighting engineers plan and prepare a lighting specification on request. This service is free of charge or obligation. Please write or phone for more information.**

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**FOR PROCESSING FRUIT PULPS, JAMS, JELLIES, JUICES WITH STEAM AND COMPRESSED AIR OR STEAM AND VACUUM ARRANGEMENTS**

***Patent No. 684357, other patents pending***

**No steam jacket is employed, there is no local overheating or skin burning of the product, no pitting or erosion.**
**NO METALLIC CONTENT IN THE FINISHED PRODUCT**

**Processing is by patent steam heated Revolving Calandria**

**The Calandria incorporates a Swash Plate Impeller**

**The rotating movement of the Calandria continually cleans the heating elements**

**The ratio of the rotating heating surface to volume is 50 per cent greater than that of a steam jacketed Autoclave resulting in greatly increased production**

**When operating as a batch fruit pulping unit added water content is controlled at a predetermined figure**

**Designed to supersede steam jacketed vessels of all types, this all purpose unit achieves results which from the point of view of economy, efficiency and quality of product cannot be equalled.**

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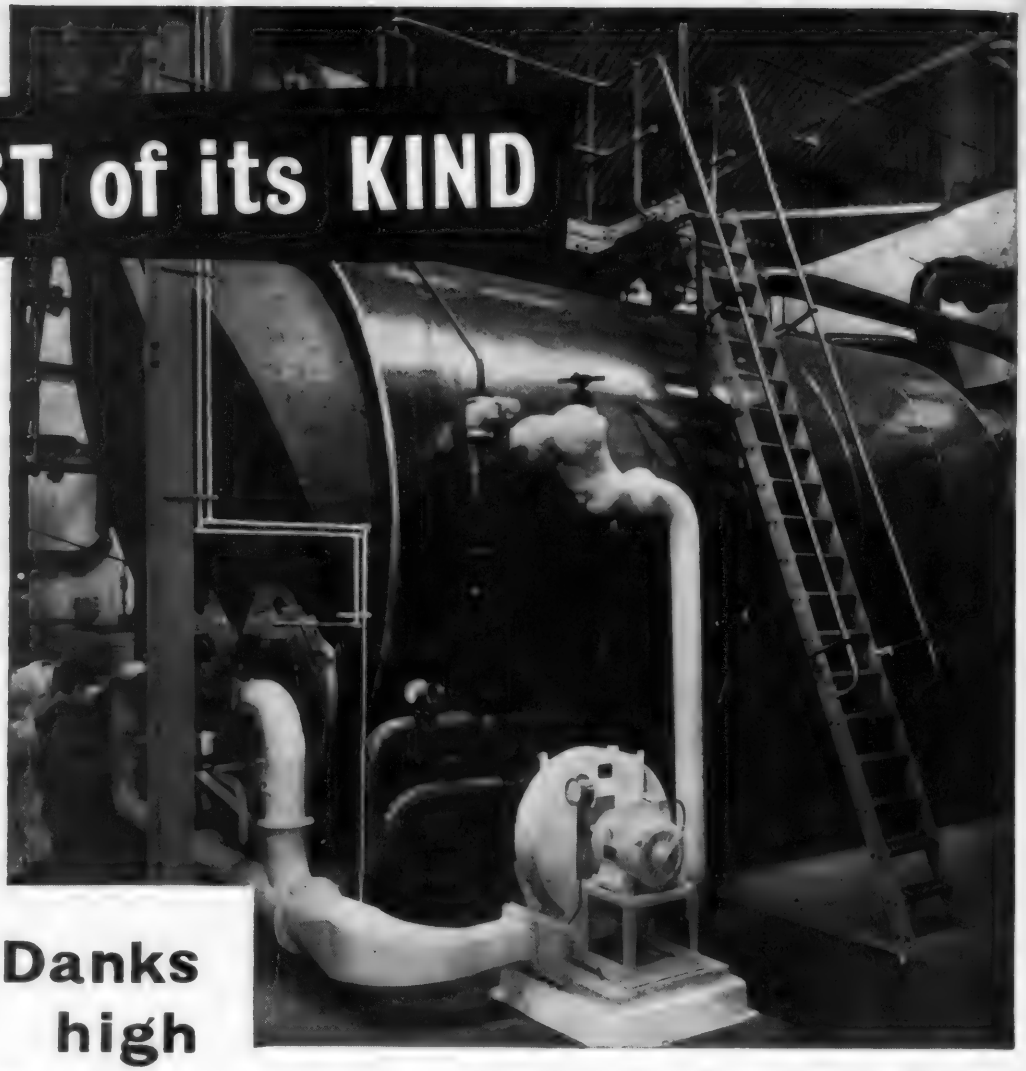

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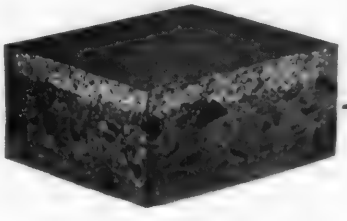

*Stelcon Floors are made in steel plate form or with a top surface of steel chippings in concrete — which means they are exceptionally tough, hard-wearing and free from maintenance bills. They are literally steel clad . . . *see!*

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*3,000 gallon stainless steel storage vessel.*

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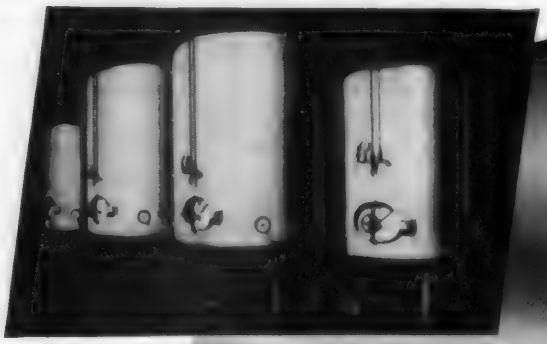

*Range of four Guinness storage vessels.*

Experts in the fabrication of stainless steel, mild steel, Monel, copper, aluminium, etc., up to ¾" plate

*Stainless steel vessel under construction at the Brentford Works of Metaducts Ltd.*

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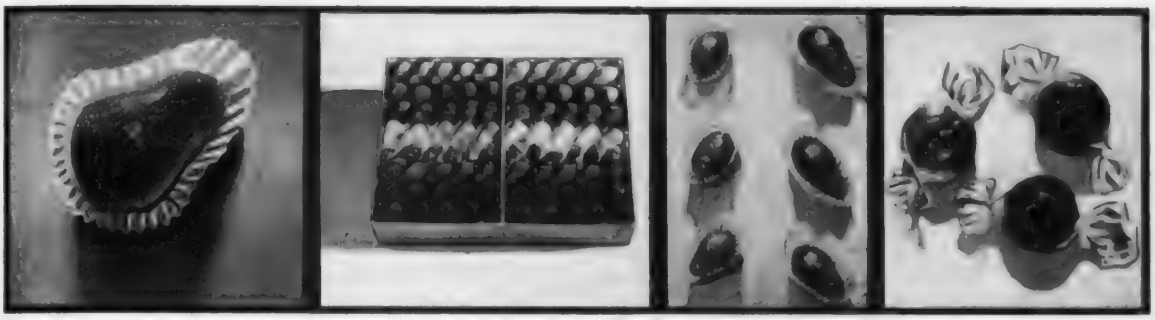

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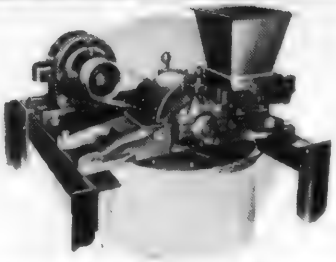
*The* **MIKRO-PULVERISER**

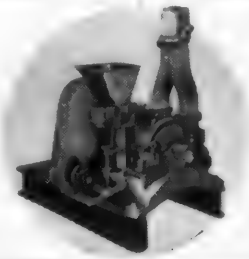


A high speed mechanical pulveriser offering a wide range of particle sizing, granular to fine grind (10—300 mesh) safe and economical for both wet and dry grinding.
Available in six sizes with capacities from 10—10,000 lbs. per hour.

*The* **MIKRO-BUD**

A new vertical hammer mill with built in air classifier for the reduction of solids to within the 80—10 micron range. Particle sizing can be changed in seconds while the machine is in operation.
10°F. maximum temperature rise.
Available in two sizes giving 35/70 lbs. per hp/hour.

*The* **MIKRO ATOMISER**



A mechanical, screenless mill for the production of smooth, ultra-fine powders in the lower micron range (25—1 microns). Compact and highly efficient.
Available in three sizes with capacities from 5—5,000 lbs. per hour.

*100% dustless operation can be achieved by connecting any of the above machines to one of our MIKRO FIL UNITS*

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Wherever insect pests are attacking stored food products, a " Pybuthrin " insecticide is always the safest answer! Containing African pyrethrum synergised with piperonyl butoxide, " Pybuthrin " is completely safe to use where foodstuffs are processed or stored, and is the basis of a new range of non-poisonous but potent Cooper insecticides. For example, where the Cacao moth *(Ephestia elutella)* is attacking cocoa beans, dried fruit, chocolate, etc., the adult moths can be successfully controlled by space spraying with " Pybuthrin " Insecticide No. 44. Normal rate of application is only ¼-pint to 15,000 cubic feet, and larvae can be controlled by spraying walls and commodities at the rate of 1 gallon to 1,000/2,000 square feet. If you have an insect problem in your premises, write for free advice and further information about " Pybuthrin " insecticides.

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● *INSECTICIDES*

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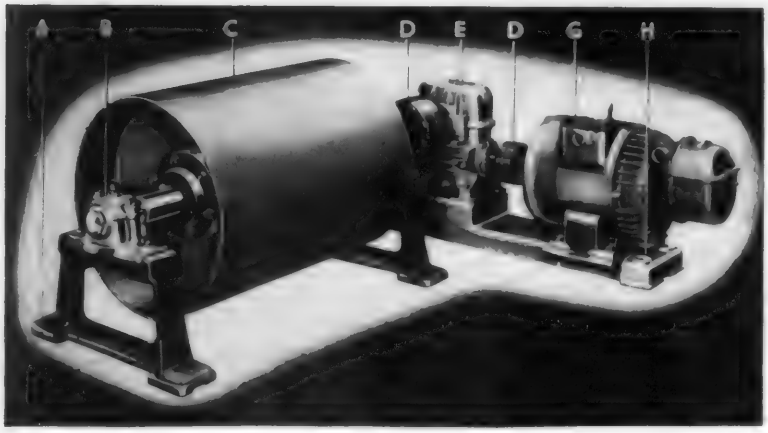


**WITH**

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- **C** Conveyor pulleys
- **D** Flexible couplings
- **E** Worm reduction gears
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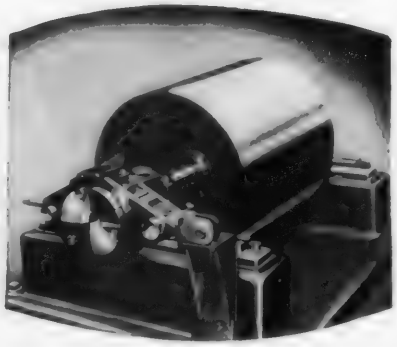
## CROFTS CONVEYOR DRIVES

**Any speed including infinitely variable control**



**and silent ratchet backstops for complete safety with inclined belt conveyors**

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# £2 PER TON CHEAPER than crystal salt

Yes, I.C.I. Granular Salt
is actually ***more*** than £2 per ton
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It's purer too.

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The correct choice of pallet can mean a big saving in handling costs and storage space: the wrong choice can be disastrous. Would it be best made from hardwood or softwood? Should it be slatted? Reversible? Single-faced? We can help you determine the specification best suited to your needs. As one of the largest pallet manufacturers in the country, with a standard range of over 50 different types, we feel sure our experience would be valuable to *you*.

***** *A few of the prominent users of YOUNGMAN pallets:—*

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*For the latest news of pallets and stillages, and other materials handling equipment see our Industrial Equipment List. For your copy address Sales Dept. FM/PS.*

## W. C. YOUNGMAN LIMITED

***MATERIALS HANDLING DIVISION***

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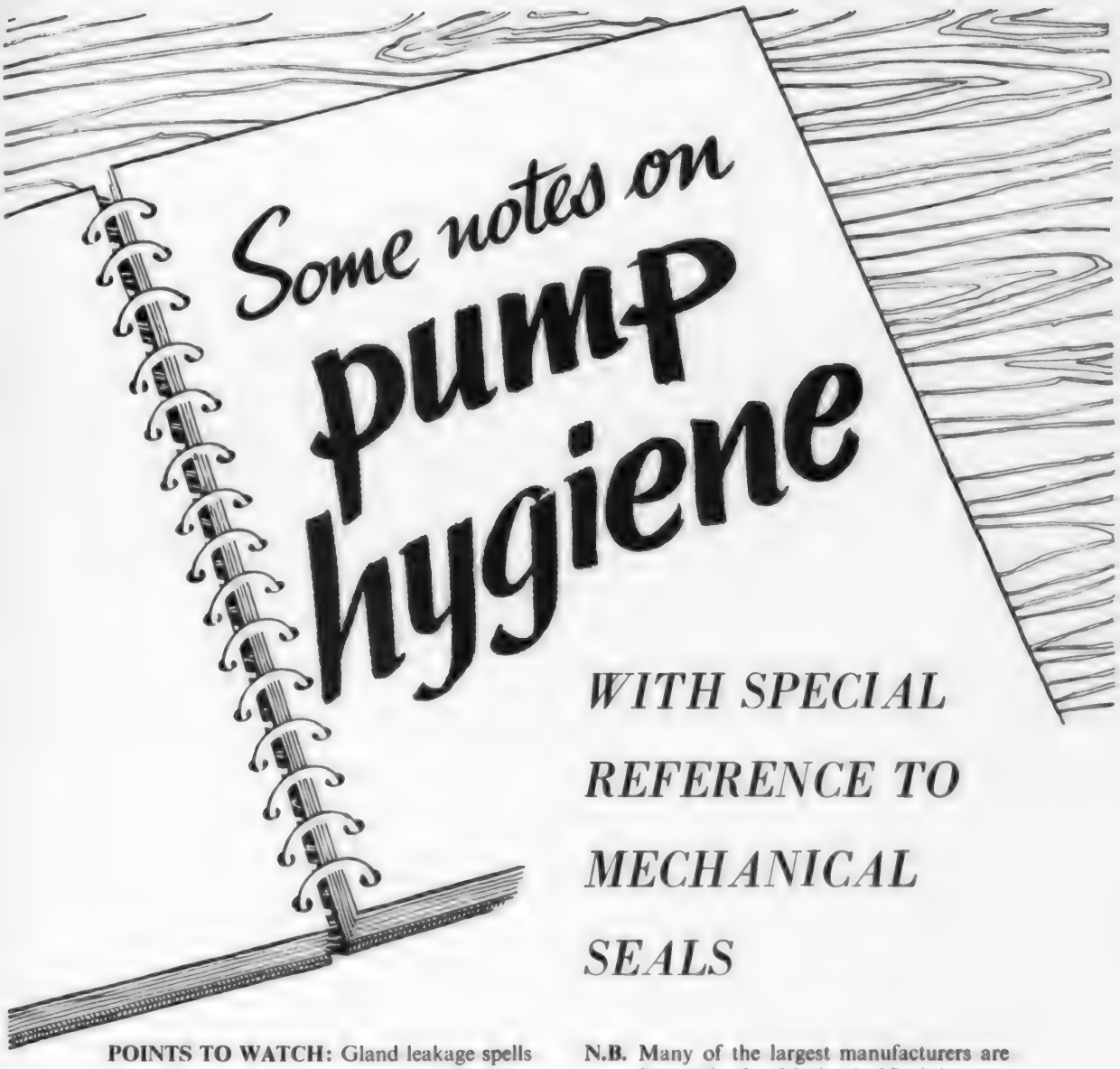

# Some notes on pump hygiene

## *WITH SPECIAL REFERENCE TO MECHANICAL SEALS*

**POINTS TO WATCH:** Gland leakage spells dirt and mess; is a potential source of bacterial infection. Soft packing tends to absorb foodstuff being handled and quickly becomes contaminated. Its cavities cannot be cleaned successfully. Soft packing also leads to scoring and grooving of pump shaft.

**ADVANTAGES OF MECHANICAL SEALS:** These seals eliminate gland leakage. There are no internal crevices in which product can lodge and provide breeding ground for bacteria.

**N.B.** Many of the largest manufacturers are fitting *Flexibox* Mechanical Seals because their design makes them particularly suitable for handling foodstuffs.

**TYPE OF PRODUCT:** Flexibox seals are successfully applied to every type of rotary shaft equipment including pumps and vessels handling soups, soft drinks, sauces, beer, etc.

**MORE INFORMATION:** Contact Flexibox *immediately* for further technical information.

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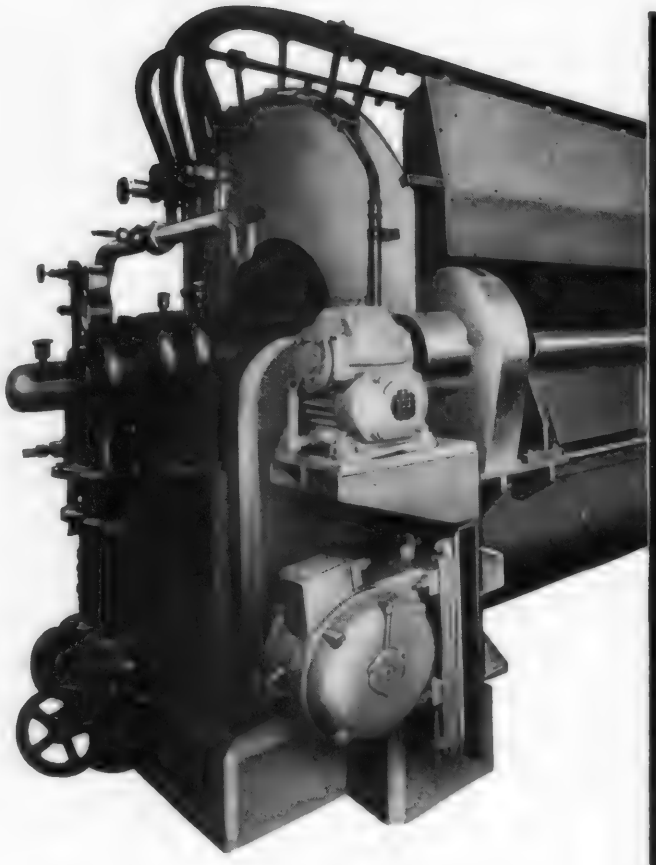
# FILTERS



One of a pair of 75 sq. ft. Paxman Filters which are installed at the Corn Products Co., Ltd., Trafford Park, Manchester. (Industrial Division of Brown & Polson Ltd.)

## *FOR THE* FOOD INDUSTRY

Many processes in the food industry involve continuous de-watering operations — in addition to which a high degree of purity must be maintained throughout. These requirements are fully complied with by Paxman Rotary Vacuum Filters, fitted with black or white rubber coverings and constructed in stainless steel, aluminium or other suitable alloy metals.

You will certainly be interested in our Publication No. 1436, a fully illustrated booklet showing some of the many applications of Paxman Rotary Vacuum Filters to modern industry. May we send you a copy?

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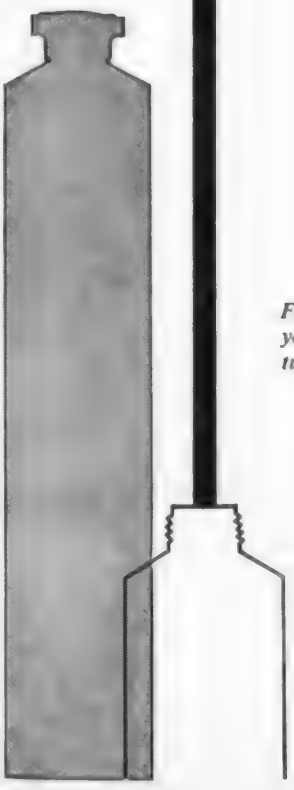
# Tubes of the future for the FOOD INDUSTRY

*Flexile's new plant at Stevenage, Herts.*

More and more food manufacturers are realising the great potentialities of collapsible tubes for packing their products. Flexile Metal Co. Ltd.—pioneers in tubes for the food industry—foresaw this when planning their new factory at Stevenage, now in operation as the most modern in the tube industry. Here no effort has been spared to ensure the most meticulous standards in efficiency, hygiene, and scientific control. Also of special interest to food manufacturers are Flexile's POLYFLEX polythene tube caps. These eliminate the use of wads—so often the cause of seepage of the product through ordinary caps. Manufacturers interested in better sales through better, more attractive, more modern packaging are invited to write for a copy of Flexile's Handbook of Essential Facts for all Tube Users*.



*Flexile will gladly advise you on the use of collapsible tubes for:*

MUSTARD
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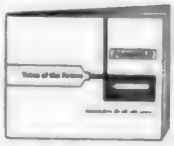
TOMATO KETCHUP
PUREES
MAYONNAISES
SAUCES
SPREADS
CONDENSED MILK
ETC., ETC.

**FLEXILE**

***The name of the future in collapsible tubes***



***Just Published***

This free brochure is specially written to help you select just the right tube for your products. Send for a copy today.

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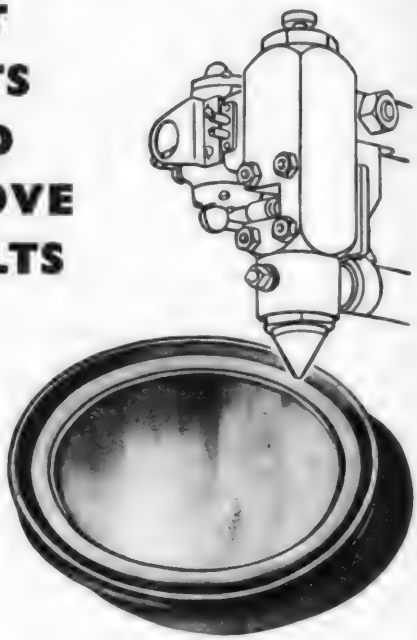
# DAREX Flowed-in GASKETS

**CUT COSTS AND IMPROVE RESULTS**



*Now!* *Flow* gaskets into place at speeds up to 300 per minute. Gaskets become integral with the part—meet a wide range of problem conditions.

SIMPLE APPLICATION. Instead of installing pre-cut gaskets by hand, you merely *flow* a synthetic resin or rubber compound into position (horizontal or vertical surface). After baking, compound becomes solid, rubbery.

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**You can create effective and lasting protection for all types of food products packed in containers.**

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*We shall be pleased to provide you with complete details of "DAREX" sealing compounds and methods of application.*

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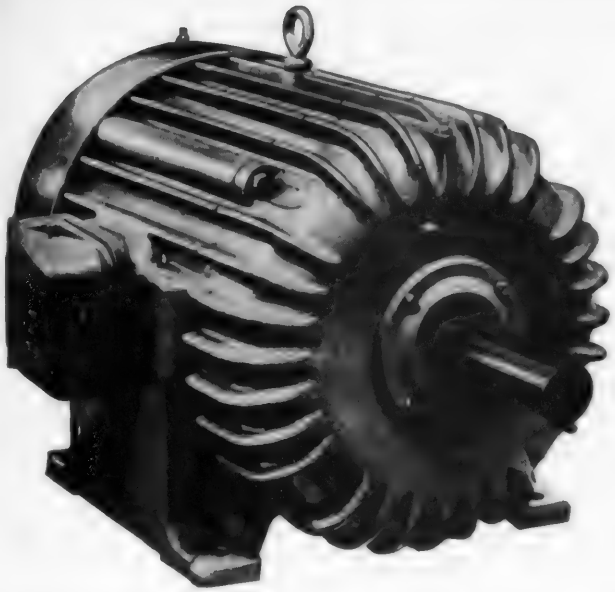

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- *Six leads brought out to terminal box*
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- *Double impregnation*
- *For normal duty in any part of the world*
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G.E.C.

# motors

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**FOR EVERY INDUSTRIAL PROCESS**

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For screening, sorting or sifting heavy minerals or fine powders.

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For restricting access and providing protection.

For improving presentation, the ornamental patterns add style and dignity to industrial design.

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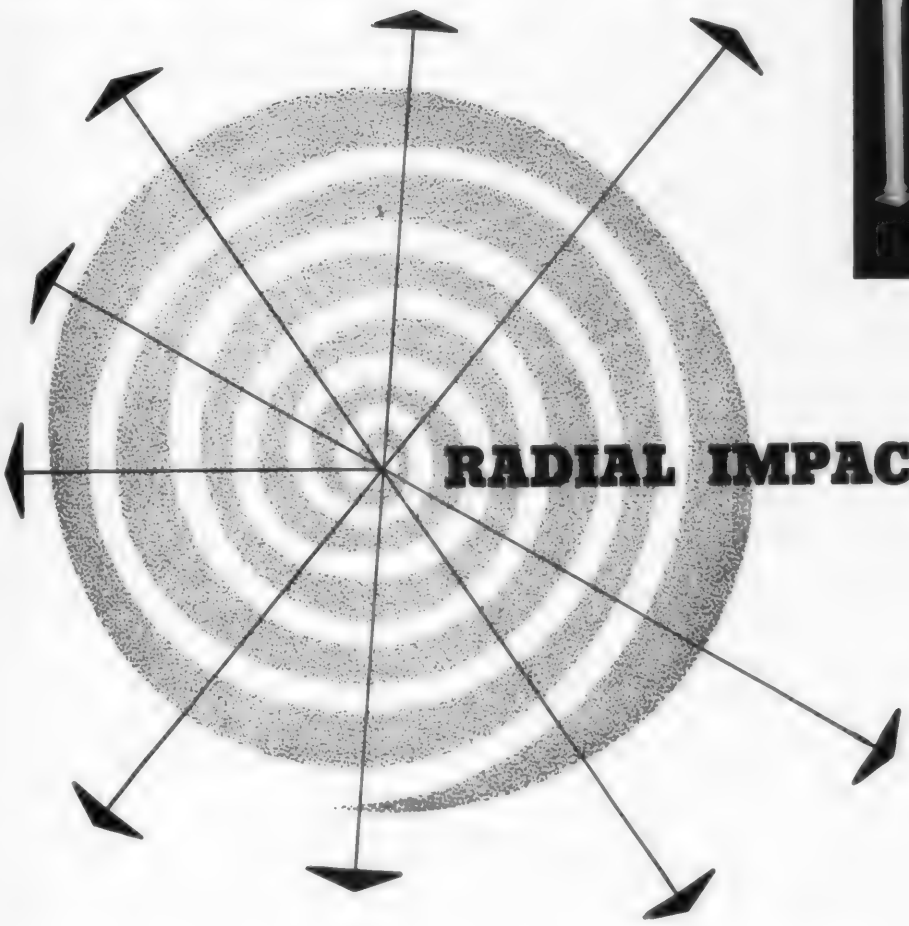

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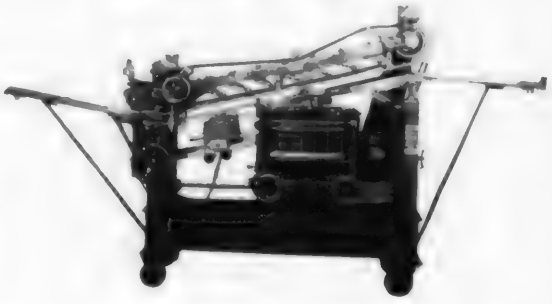

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The author's experience began at the age of twenty when he was appointed manager of coffee estates in Uganda. He was directly connected with the formation of the Kilimanjaro Native Planters' Association, now the K.N.C.U. In connection with his botanical collecting work for Kew and the British Museum he was elected a Fellow of the Linnean Society in 1928, and later, in 1930, he took charge of an Agricultural Training School. He now contributes to many journals at home and overseas, and has written several books on fibres.

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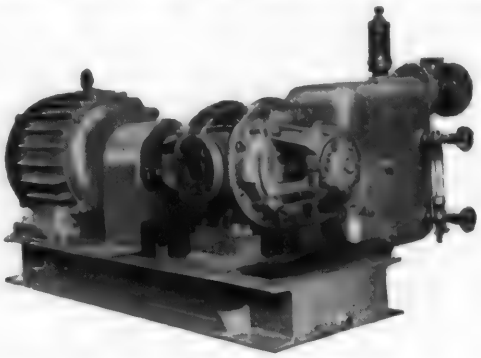

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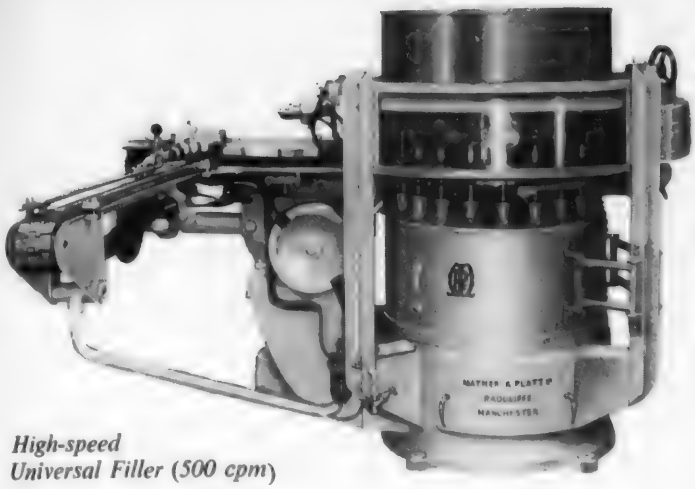


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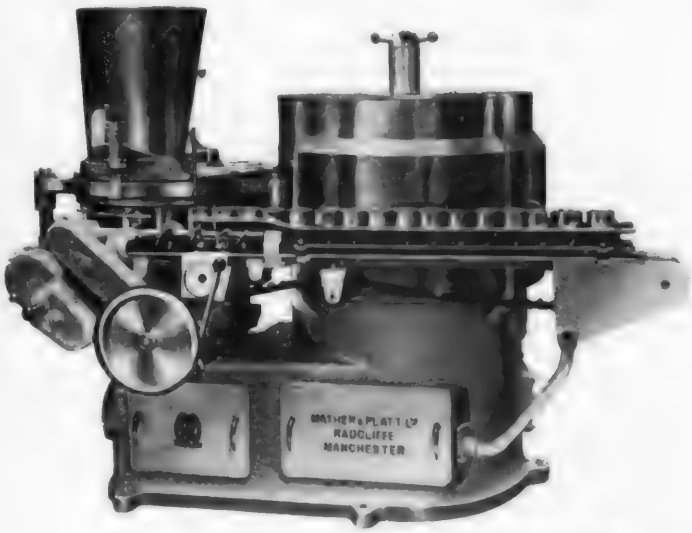


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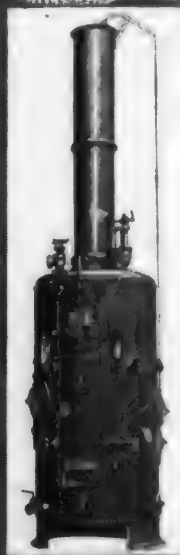

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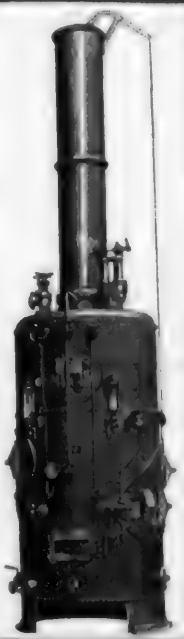

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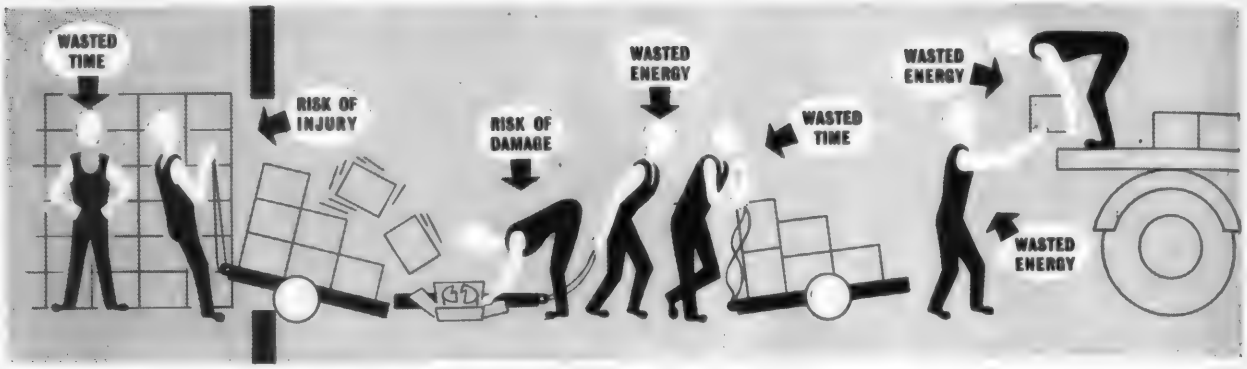


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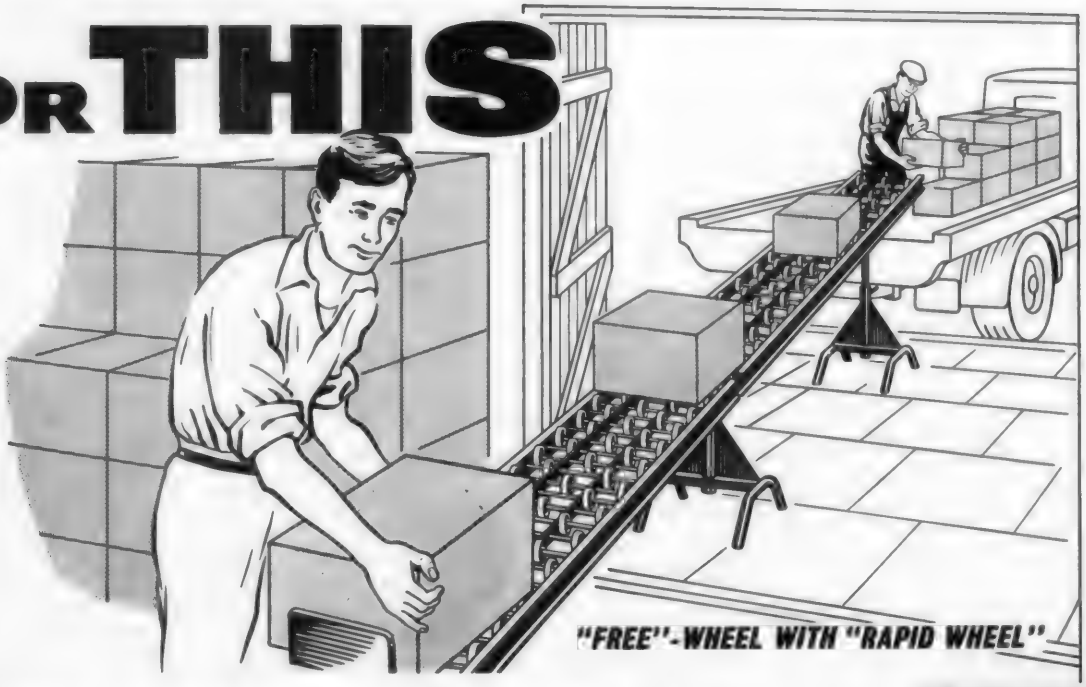


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# FOOD MANUFACTURE

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FOOD MANUFACTURE

Vol. XXXII, No. 6 June 1, 1957

## *Canners reach for the sky*

DURING the 130-year old history of canning the basic techniques of "foods hermetically sealed and processed in a metal container" have altered surprisingly little since the days of Appert and Donkin. However, the range of canned foods has increased enormously—especially in the past three decades—and seems potentially limitless. Meat, fish, milk, fruit, and vegetables are canned in enormous quantities each year; butter, soups, sausages, tomato juice, etc., are regularly canned, and on the periphery of the industry we find such unusual items as squid, scrapple, hominy, horse-meat, and fish-balls.

In spite of the growing popularity of quick-frozen foods, canned goods more than hold their own as the world's first and most widely sought type of convenience food. Recent statistics show approximately 45 lb. per head of canned food was eaten in the U.K. in 1955. This country is the world's second largest user of canned foods, but we are far behind the U.S.A. in our *caput* consumption. There, the consumption is almost three times as high as in this country.

The greater use of canned goods during the war has undoubtedly played a large part in the development of the industry, but many other factors have contributed to the present popularity of canned foods. The demand for out-of-season fruits, the distance of producing areas from consuming areas, the need to dispose of surpluses and many other reasons have helped to build up the industry to its present gigantic proportions. The consumption of canned foods in Britain, Canada, Australia, and the U.S.A. has risen each year since the war.

Although the essentials of the food canning process —the filling of a tinplate container with food and sauce, syrup, soup, brine, or gelatin, exhausting it of air, the sealing on of a lid, its sterilisation and ultimate cooling are unchanged, they have been elaborated and developed considerably. The industry is dynamic, and new developments in manufacture, processing, and packaging are in constant demand. Some of the latest technical advances include high-speed food preparation machinery, advanced cooking, and sterilisation techniques and electronic grading.

British canners are tempering optimism with caution, but the signs are that there will be a record pack this year. In this issue of FOOD MANUFACTURE we survey some technological advances in this multi-millionaire industry.

## *1,700 unenlightened manufacturers*

"BY skilful buying and skilful selling we can make all the profit we need." This attitude, with its implied scepticism of the value of scientific methods, is largely responsible for the staggering fact that about 1,700 British food manufacturing firms appear to make no use whatsoever of research facilities. These companies apparently neither employ scientists nor see the use of a research association.

The remark about skilful selling and buying was made to Dr. F. H. Banfield, director of research of the British Food Manufacturing Industries Research Association. He recounted it to us last month when he told us of his association's plans to break through the barrier of apathy and complacency and to recruit more firms as members. Although the association has been going for close on 40 years, it still has only 500 members. No doubt these members account for a large proportion of the food industry. It is nevertheless a shock to realise that more than three times that number of firms have no interest in food research.

In the days of plenty, when we could buy where we pleased, no doubt a skilful buyer could make his firm profitable. But those days are largely past, and now that Britain cannot pick and choose in the world commodity markets skilful buying is certainly not enough. Skilful selling, too, cannot now be the complete answer for the public's buying habits are becoming increasingly influenced by the products born of science and technology which are being marketed in ever larger quantities by the big firms. The growing demand for foods in "convenience" packs is another reason why the manufacturer who scorns science will eventually find himself out on a limb.

The B.F.M.I.R.A. estimated that the 1,700 "unscientific" firms each employ no more than 30 pro-

ductive operatives so that they obviously cannot afford their own research department. Nearly a thousand of these are in London and Lancashire; 240 are in Birmingham and district; 180 in Scotland; 120 each in Nottingham, Newcastle, and Yorkshire; 60 in Bristol and the West Country, and 60 in Northern Ireland.

The association plans to take the gospel of research to these firms with a liaison and advisory unit which, on request, will visit factories and investigate one manufacturing problem on the spot without charge. One demonstration, they feel, is worth a thousand words. If firms do not invite the unit, they will be asked if it can visit them when it is in the neighbourhood.

Dr. Banfield emphatically dispelled any idea that the association is concerned only with fundamental research. It is very much a "trouble shooting" organisation, as is evidenced by the fact that it gets 10,000 enquiries a year.

A firm employing 24 productive employees can be a member for £20 a year, "less than the cost of a packet of cigarettes a day," said Dr. Banfield. It is indeed a tiny sum to pay for the research facilities without which no firm can hope to survive in the long run. We wish the association every success in their campaign to bring enlightenment to the backward.

## *Freeze-grinding preserves flavours*

THE flavour of many foods may be improved by "freeze-grinding," a new technique which permits the powdering of materials normally impossible to grind satisfactorily. For example, the flavours of dried almonds, apricot kernels, coconut, spices, ginger, cinnamon, pepper, etc., lie in their respective oils. Grinding them is normally a slow process because otherwise excessive heat would drive off the oil, spoil the flavour, and probably produce a sticky paste instead of a powder. All these materials have been satisfactorily processed by freeze-grinding.

The process, which has been developed by British Oxygen Research and Development, Ltd., was fully described by Arthur Bracken and L. J. Brittain in our associated journal *Manufacturing Chemist* (December, 1956, p. 497). The material to be pulverised is passed through a stainless steel chamber and cooled to a very low temperature by liquid nitrogen, so that it becomes brittle and friable. The grinder then breaks it up much more easily, quickly, and "neatly," the particles tending to be of more regular shape and more uniform than when ground at normal temperatures.

New techniques open the way to new ideas. Freeze-grinding may be the start of some entirely new processes, and it will be interesting to see what the food industry will make of the new development.

## *National campaign against corrosion*

THE campaign against the costly evil of corrosion which was started in this country over three years ago by the launching of our associated journal, *Corrosion Technology*, will be intensified during the next six months and culminate in Britain's first National Anti-Corrosion Week, October 14 to 18. During this week *Corrosion Technology* will sponsor two major events: an exhibition of materials, methods, and equipment for combating corrosion, and a convention at which leading authorities will examine and discuss the consequences of corrosion in various industries and the means for fighting corrosion.

The Exhibition will be held for three days, Tuesday to Thursday, October 15-17, at the Royal Horticultural Society's Old Hall, Vincent Square, Westminster. The Convention will be held on Tuesday and Wednesday, October 15 and 16, at the Central Hall, Westminster. These venues are within easy walking distance of each other.

The Convention programme, which is being organised by the Editor of *Corrosion Technology* and his staff, envisages reserving the first day for papers on corrosion problems in major industries, and the second to anti-corrosion methods and services, *e.g.* paints, metal spraying, cathodic protection, water treatment, etc.

Already a number of leading experts have promised to give papers on the chosen subjects. These papers will be available to delegates as preprints so that at the Convention itself the maximum time possible will be available for discussion. Discussion sessions are, of course, the *raison d'être* of conferences, and the organisers are taking steps to ensure that a complete record of these discussions will be published after the convention.

Invitations are being sent to thousands of scientists, technologists, and executives in this country and abroad, particularly the U.S. and Europe where *Corrosion Technology* has won a considerable reputation. The Convention fee is two guineas per delegate, which includes a set of preprints. A Convention Dinner will also be held, and fuller details will be available later.

Both the Exhibition and Convention are receiving the widest publicity through the press, particularly through the Leonard Hill Group of 16 specialised journals. With the full weight of this Group behind it, National Anti-Corrosion Week promises to be a great success.

Exhibition space is available to firms wishing to display their materials, equipment, and services. Charges are moderate and include the provision of a shell stand. Full details are available from: The Exhibition Manager, *Corrosion Technology*, Stratford House, Eden Street, London, N.W.1.

## *Women technologists*

SO MUCH emphasis has been laid upon the need for technical education that the point of the argument is in danger of becoming blunted by constant reiteration. There seems, however, to be a certain reticence about one aspect of the situation—what has been coyly called the "new game of *cherchez la femme*" or the problem of persuading women to become technologists.

It is a two-sided problem because there is also the difficulty of finding work for qualified women. The experiences of the National College of Food Technology are illuminating. From the outset, both men and women students have been accepted, but in general the Principal has found it hard to obtain appointments for women in the food industry on completion of their courses. Naturally he has felt obliged to advise prospective women students of this difficulty, and naturally this has deterred them from joining the College.

The White Paper on Technical Education and Sir David Eccles, when he was Minister of Education, were anything but reticent about the subject. In fact, they were both enthusiastic about the reserves of talent in girls' grammar schools, but employers and the prospective fair employees are more wary. Employers seem reluctant to take chances—though from what one hears women technologists work quite well in, say, Russia—and the girls would like some clear definition of the "unlimited opportunities" open to them. It will be interesting to see the results of the Food Manufacturers' Federation's recent survey among their members to ascertain the prospects for women technologists in the food industry.

## *Antibiotics and human growth*

AFTER it was demonstrated that antibiotics could accelerate the growth rate of animals, it was inevitable that someone would attempt to discover whether these substances could do the same for human beings. It must have been extremely difficult to arrange trials because, although medicinal antibiotics are non-toxic, the ingestion of even trace quantities can provoke the development of antibiotic-resistant strains of pathogens. It is this danger—which could result in a serious diminution in the therapeutic value of antibiotics—which has led to the strict control over the use of these drugs exercised in most countries.

These risks must have been weighed very carefully before commencing the trials which have now been carried out on 64 schoolchildren in Haiti. They were arranged by Dr. E. E. Loughlin of the New York Medical College and Dr. N. C. Wetzel of Cleveland—both specialists in tropical diseases—in conjunction with the Haitian government. They showed that children suffering from growth failure due to poor diets benefited from a daily dose of 50 mg. *Terramycin*. Another group of children received daily one gram of the amino acid, lysine. They also benefited, but not to the same extent. A third group received only 10 mg. daily of the antibiotic. They showed the least growth development. A fourth group received neither the antibiotic nor lysine and were used as controls.

These results were obtained with a six-month trial. A longer investigation is now planned to determine the long-range effects of antibiotic supplementation of diet. It is on the results of these new investigations that the future—if any—of this form of nutritional supplementation depends.

At this stage it seems doubtful that antibiotics will ever gain wide acceptance as items of diet. At the most they may have a future as dietary auxiliaries for strictly controlled use in cases of malnutrition.

It is to be hoped that the Haitian experiments may shed more light on the precise mode of action of antibiotics as growth stimulants in both man and animals.

## *Bigger pigs for Britons*

A CALL for bigger pigs put out by Walls at the Farmers' Club last month may be the most definite step yet in an entirely new concept of meat production and marketing. It means that the growing trend for prepacked and easily prepared "convenience foods" might not only have a decisive effect on patterns of livestock production, but may mean a cut in the tonnage of imported feedingstuffs and higher imports of bacon and other specialised pork products. On a somewhat lesser level Walls have formed Walls (Handy Foods), Ltd., and are reported to be considering the possibility of prepacking fresh meat.

Walls, who need the heavy pigs to help them in their plans to treble their output of prepacked foods within the next few years, have appointed Mr. Collan Brett, a pig breeder and a director of the firm, as director of their new Pig Advisory Service. Mr. Brett said that the company would require up to 15,000 heavy pigs a week, and are opening a new highly mechanised slaughterhouse in London soon, while another is planned for Godley for next year.

Mr. Brett thinks the new policy should benefit everybody, including the consumer and the pig producer. For the manufacturer it will mean considerably less labour costs per pound for slaughtering and boning out and a higher percentage yield of boneless meat.

It would appear that the main immediate effect of the policy will be to cut short the current development of Landrace and bacon pigs in competition with Denmark. First comments from producers seem to

be favourable, no doubt influenced by the news that Walls are to increase their use of these pigs by from 200 to 300%, and by the certain knowledge that others in the meat industry will follow suit. The policy White Paper on the pig industry last November referred to "promising developments which are taking place today in the marketing of meat and livestock generally." Walls' plans are the first of these developments.

## *Mr. Peek and Mr. Frean*

JUBILEES, centenaries, and even more impressive anniversaries are becoming commonplace in the food industry. The latest is the centenary of Peek, Frean and Co., Ltd. They set a generous example to other long-established companies by distributing a sum of £40,000 in cash and kind to their employees and pensioners. They were also in the unique position of being able to give a "half-term report" in the form of a film showing the operation of their Bermondsey factory in 1906 (see p. 299).

Seven years after Peek, Frean's were established, Henry Mayhew the sociological journalist, famous for his *London Labour and the London Poor*, visited their factory and was filled with admiration at its size. What he would have made of it today is pleasant to conjecture. He would have to increase his "200 boys, 150 girls, and 150 men" to a total of 4,000. His dough mixer—"a huge iron drum bigger than a hogshead"—would now be mixing drums of the company's own design. Even his exuberant vocabulary might be challenged by poly-fuel ovens, S.I.G. wrapping machines, and the *Valco* automatic weighing-and-filling plant for *Cheeselets* and *Hotel* biscuits. His astonishing "thirty-eight-foot ovens" would have stretched to an almost unbelievable 172 ft., and he would see in front of them the automatic feeding of endless dough blankets carried under a continuous cutting machine.

Although the genial figures of Mr. Peek and Mr. Frean are as widely known today as their famous biscuits, there has been neither a Peek nor a Frean in the business since 1904. The company was founded by James Peek, a prosperous tea merchant, to please his two sons who disliked the tea business, and George Hender Frean was engaged as a manager and partner. Evidently Mr. Peek's sons were bored by biscuits; one retired to the country and the other became a clergyman, but Frean persevered, taking his friend John Carr into partnership. Since then there has always been a Carr as partner or director in the company. James Peek did not give in, but he could not have been very happy about the new situation. A contemporary says he had "a horror of beards," and both Frean and Carr were luxuriantly whiskered.

Nineteenth-century biscuits—still in the ships' biscuit stage—were indigestible and hard as bricks. They could be enjoyed only by those with good teeth. The fortitude with which the Victorians ate them was testimony to the spirit of Trafalgar, but it is no wonder that when, in 1865, John Carr invented a new process for the manufacture of *Pearl* biscuits—making them short, crisp, crumbly, and selling more to the pound—they swept the country. In the following year Peek, Frean staggered their competitors by buying 10 acres at Bermondsey for a new factory. When during the Franco-Prussian war of 1870 the French Government bought ten million fine Navy biscuits (nearly 5,000 tons) for the besieged Parisians, the company sprang into international prominence.

Three years later Peek, Frean's old factory burned out, but this proved to be a blessing in disguise since production at the new Bermondsey works was speeded up so much that soon the previous combined total output of both old and new bakeries had been exceeded. Since then the history of the company has been one of steady development, and now there are factories in Canada, Australia, and India.

## *International House*

ONE OF the many interesting impressions of world trade gathered by Mr. W. Leonard Hill, chairman of the Leonard Hill Group which publishes FOOD MANUFACTURE and its 15 associated journals, during his recent world tour, was obtained during a visit to International House in New Orleans. Founded in 1943, it is claimed to be the world's first non-profit making clearing house and meeting place for international traders.

International House is a 10-story building in the heart of New Orleans. The first four floors have been converted into a well-appointed club with extensive office facilities. Visitors arriving in New Orleans to do business are made guest members and can make use of private office space complete with bilingual secretarial service, a world trade reference library with a trained research staff and guidance by experts in foreign trade who also provide trade contacts and information on purchasing, selling and shipping.

By helping others, New Orleans businessmen have helped themselves. Today the port of New Orleans is the most efficient in the United States, second in dollar volume only to New York, and International House is expecting to do even better. Within five years New Orleans expects to have a new $3 to $5 million International Center, housing International House, International Trade Mart and Cordell Hull Hall, a national memorial to the late Secretary of State who founded the "Good Neighbour Policy"—which in spirit is International House.

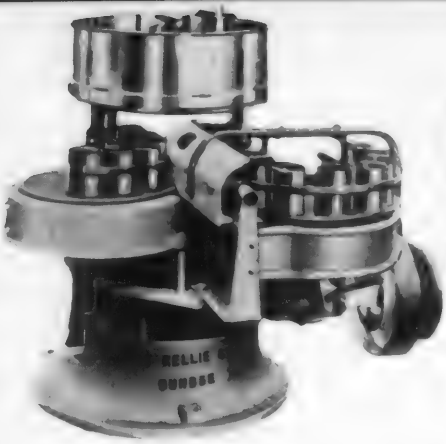
# CANNING

## "FOOD MANUFACTURE'S" SURVEY OF TECHNICAL DEVELOPMENTS

*Self Service influences label design. Strong branding instead of the conventional illustration of contents characterises this label designed by Lonsdale-Hands Associates.*

- Plant and Equipment for the Canner
- Advances in Meat Canning
- Bacteriology of Canned Fish
- Canning Pilchards in Cornwall
- Canning Bread and Bakery Products
- Safety devices for Double Seaming Large Cans
- Cannery Instrumentation

**Full steam ahead on the last stage of the pea line. The cans are tracked down from the loft above to be filled and sealed. This photograph, taken at one of Smedley's plants, catches something of the furious tempo characteristic of the factory at the height of the season.**



Rotary syruper.

## Filling Machines

The range of food canning equipment built by Robert Kellie and Son, Ltd., includes fillers, blanchers, syrupers, peelers and washers.

The 11 FP "High Speed" automatic straight-line filling machine is designed for filling liquids, semi-liquids and viscous products. It is claimed to have exceptionally high filling rates, but gentle handling of delicate fruits is assured, and whole fruits such as strawberries and cherries are said to enter their containers without crushing or bruising. Controls lie easily to hand, and safety measures are an important feature of this machine.

Clean and splashless filling of peas and beans at up to 180 cans per min. is claimed for the Kellie 10-head automatic filling machine. To prevent air trapping in the cans and liquid overflowing this machine first fills half the liquid, then the solids, followed by the remainder of the liquid.

Any period of blanch for peas, beans, beets, potatoes, etc., from 2 to 20 min. is obtainable on the Kellie continuous blancher and re-washer by movement of a single lever. One 5 b.h.p. motor drives the combined unit. A filling rate of 40 to 80 cans or jars per min. to within an exact distance from the top regardless of the quantity of fruits or solids filled into the can is claimed for the Kellie continuous rotary syruping machine. Waste is prevented by the "no can no fill" arrangement. The cans having a lift of 2½ in. will operate even when overfilled on fruits such as pears, apples, plums, etc., without any mashing of the fruit.

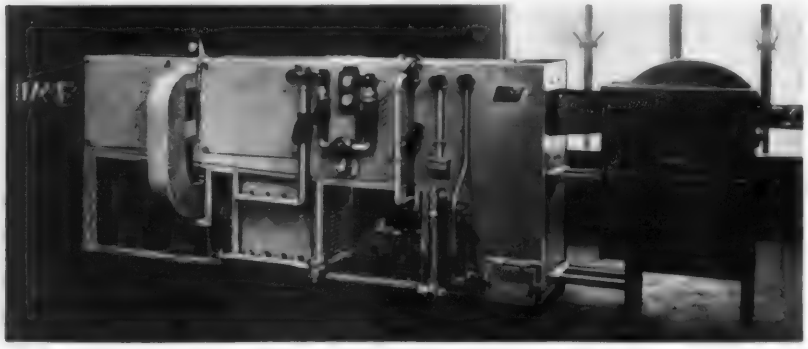
To improve the appearance of the finished product, Kellies have developed their can washing and scrubbing machine for filled cans. The cans are fed under a rotary brush wheel which cleans the body of the can and from there they pass to the side brushes which thoroughly wipe both ends and clean out around the flanges.

## Beer Can Filler

To cope with the growing popularity of canned beer, the Farringdon Works and H. Pontifex and Sons, Ltd., have designed a 24 head filling machine, suitable for filling either flat-topped or cone-topped cans of varying capacities and of course all sizes of bottles. This is accomplished merely by changing filling tubes and rubber holders and is quite a simple matter. An average speed is about 300 dozen cans per hr., although on half-pint bottles the filler exceeds 400 dozen per hr. In addition, the larger Pontifex filler having 36 heads, when coupled to a C.R. seamer has an output of over 700 dozen 10 oz. cans per hr.

The machines are fully automatic and are fitted with an air-operated clutch which is very smooth in action. Air cut-outs are also a feature which bring the machine to an immediate standstill should either a bottle break or a can jam in the starwheels feeding or discharging the containers. The lifts are also operated by air pressure.

The canning of beer was first carried out over 20 years ago, by the Felinfoel Brewery on a Pontifex machine.



## Can Washer, Rinser and Dryer

*This Dawson "Straight Line" can washer, rinser and drier is claimed to have a capacity of up to 120 cans per min. A separate drive unit is fitted in front of the washer to receive the cans and drive them through "V" belts and tensioned pulleys, to push them through the machine on guide bars which invert the cans prior to entering the rinsing zone and turn them back again after leaving the drying section.*

*The cans receive the following treatment; a pumped detergent wash from a circulating motorised pump at 160°F., and then a clean scalding hot water rinse at 180/160°F., by means of a steam and water mixing valve. This scalding rinse partially dries the cans and drying is completed by direct air jets which are blown into and around the can by means of a motor driven centrifugal fan drawing air from a steam heated gilled tube heater battery.*

*The machine is constructed in mild steel plate electrically welded and metal sprayed to prevent corrosion, the drying section being suitably lagged. It has an overall length of 16 ft. 3 in. × 3 ft. wide.*

## Can Lining Unit

Dewey and Almy's No. 16A high speed lining machine, developed in the U.S. and recently introduced into Europe, is built primarily to operate in conjunction with the double die presses running at 600 cans ends per min. The machine has a minimum practical speed of 300 ends per min. and is no more complex than the lower output No. 8A/8B series. The principles of operation are identical, with the new machine built to stand very high speeds without abnormal wear.

This lining machine has been coupled to a model "S" gas fired drying oven, the entire unit being called "The No. 17 Unit."

Dewey and Almy offer the can manufacturer this high speed unit for the lining and drying of their *Darex* water base compounds. It is built by the International Machinery Corporation of Belgium and its speed is geared up to 300 can ends per min., which means that when running in conjunction with a 600 per min. press two such units are required.

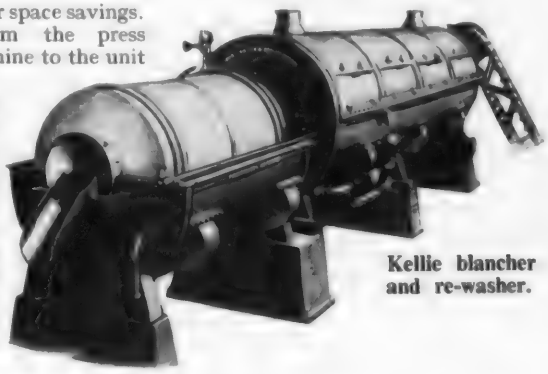
The following advantages are claimed for the unit:

# NT FOR THE CANNER

Lower labour costs. Floor space savings.

Automatic lines from the press through the curling machine to the unit can now be used.

The No. 16A lining machine is a single nozzle machine working at very high efficiency. The model "S" drying oven is of the turret type with automatic lighting with spark plug ignition, is fitted with electronic flame detection and has a quick drying time of 4½ min. at 300 ends per min.



**Kellie blancher and re-washer.**

**High-speed can lining machine to operate with double die presses running at 600 can ends per min. Makers are Dewey and Almy.**

## High Vacuum Pumps

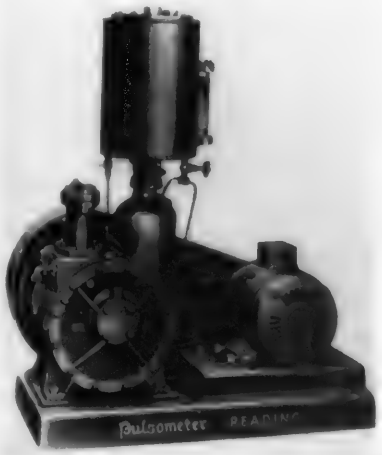
Two pumps are made by the Pulsometer Engineering Co., Ltd., especially for vacuum canning applications. These are the 6 in. and the model 6/20.

These pumps have a nominal swept volume of approximately 20 cu. ft. per min. and are capable of a relatively high degree of vacuum, being tested to 0·01 mm. Hg.

The 6/20 pump can also be arranged with a specially protected rotor bearing construction, which ensures that in conditions where vapour and fumes are passed through the pump these highly tested precision parts will not be contaminated as they are completely isolated from the working system with rotary seals.

In packing some products such as coffee it is necessary to obtain the highest possible vacuum before charging with an inert gas if the full quality and flavour is to be preserved. Hence the value of *Pulsometer* high vacuum pumps with their very low ultimate pressure.

Many vacuum packing applications generate water vapour which has to pass through the pump causing deterioration in its performance. To overcome this problem Pulsometer can now fit an air injection scavenging system.




**Model 6/20 high vacuum pump made by Pulsometer.**

## Sterilising Canned Foods

Proper sterilisation of food in sealed containers is based on the principle that the product must be heated to such temperatures and for such times as is necessary to destroy the spores in the very centre of the product. The rate of heat penetration varies very considerably according to the size of the container, the nature and consistency of the material being processed and other factors. In general the rate of heat penetration is lower in large containers tightly packed with solid material, but where the product is liquid the penetration is more rapid due to heat transfer by convection. The rate of heat penetration is also influenced by the amount of fat present, the position of the container in the retort and the circulation of the steam.

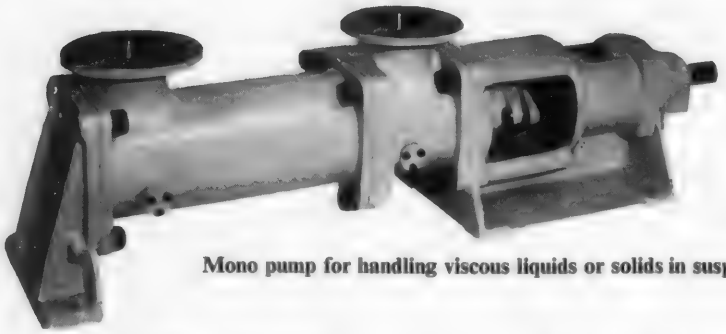
A special thermocouple is available from the Foster Instrument Co., Ltd., for accurately measuring the temperature at the centre of the product in the container. This thermocouple is in the form of a concentric needle 2 mm. diameter and 40 mm. long attached to a shank 100 mm. long screwed O BA. thread and terminating in a cylindrical barrel into which the connecting cable is fastened. The thermocouple is inserted through a hole in the container and secured by washers and nuts on the threaded shank. Various methods of fixing are available.

The connecting lead, which is a circular section tough rubber sheathed compensating cable having the same characteristics as the thermocouple, is permanently fixed in the connector barrel and vulcanised in order to prevent steam pressure penetrating along the cores. The cable passes through a pressure gland in the wall of the retort and is connected to a suitable fixed or portable temperature indicator or recording instrument.

The actual sensitive measuring portion of the thermocouple is at the tip of the needle portion which is embedded in the product in the container. Whilst a large portion of the thermocouple is outside the container and at the higher temperature of the retort this does not affect, in any way, the readings due to the temperature at the needle tip. Tests have also proved that the diameter of the needle is so small that no errors of any consequence are caused by heat conduction along this portion from the outside of the container.

For the measuring instrument to be used in conjunction with these thermocouples the portable pattern is usually the most convenient. The scale is 7 in. long being divided every 10° and is provided with knife-edge pointer and antiparallax mirror for accurate reading.

Alternatively, a continuous record of the temperature may be obtained by using a continuous strip chart recorder. These can be supplied recording up to six different points, each in a different colour.



**Mono pump for handling viscous liquids or solids in suspension.**

## High Speed Seamer

For the canning of fruits and vegetables the Premier Filterpress Co.'s high speed seamer, type N.16, has become popular. It is designed to give high outputs when handling thin liquids (brine, syrup, etc.) without spill, special care having been taken both with the initial separator discs and steady acceleration and smooth movement of the cans.

This seamer can be fitted with a 10-head liquid filler and where the pack is a solid and liquid content the cans are fed on to the machine already containing such solids. This system is claimed to have the following advantages; the dry product is not normally spillable and the liquid filler being actually part of the seaming machine, the cans are under complete control from this point to the final closing so that spillage is almost completely eliminated. Further, the liquid in the filler can be kept at almost boiling point and as the closing occurs within a matter of seconds of the liquid filling, a comparatively high vacuum is obtained in the closed can without having to run the cans through long exhausters.

Some canners prefer the steam flow method and a steam flow attachment can be fitted. The seamer can, of course, be used solely for liquids, such as fruit juices, milk and soups.

## Pumping Viscous Liquids

The principle of pumping used in the *Mono* pump enables it to be used effectively in canning processes involving the handling of viscous liquids or solids in suspension. When the pump is in operation, the rotor and stator engage with one another in such a way that cells or chambers of uniform shape and size are continuously created. This principle enables the pump to handle solids such as diced vegetables or peas suspended in liquid resulting in an unusually high percentage of undamaged vegetables passing through the pump. The pumps are also used for handling return water or for pumping brine to filling machines.

The *Mono* pump has several attributes which are of particular interest to the food industry. It is self-priming —the liquid in which the solids are suspended being used as the requisite lubricant. The low-fluid velocity through the pump is very useful when handling thick soups. Suitable speeds can be chosen to conform with the viscosity rating of the fluid. To cope with the problem of corrosion, the pump can be constructed of stainless steel. In addition, non-contaminating materials are used for internal parts and the flow is non-pulsating so that, by pumping, the full flavour of the soup is retained and the aroma is unimpaired while the stability and the viscosity remain unaffected. The pump is smooth and silent in operation and the makers claim that maintenance costs are reduced to a minimum.

## Fish Gutting

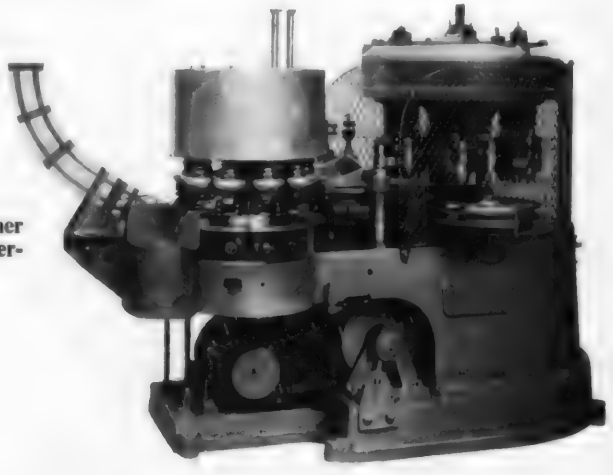
Before fish are canned, the preliminary operations are of the utmost importance.

Freshly caught fish arriving at the cannery in boxes or baskets for treatment within 24 hr. of being caught, are usually washed to remove the scales (however, this is sometimes dispensed with) headed and gutted. In some cases the tail membrane is removed and the fish re-washed and drained, after which it is placed in the cans for spicing and cooking.

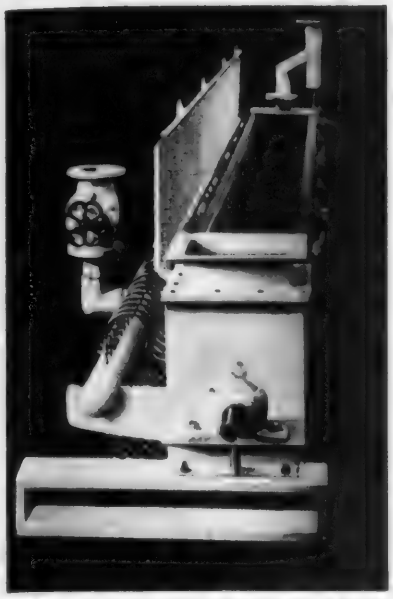
Until comparatively recently heading and gutting was carried out by hand. The herring, etc., arrived at intervals, perhaps in small quantities, but frequently with a glut catch that involved the immediate recruitment of a large labour force. When the work was completed most of the workers were paid off and the responsibility of the employer ceased. Except in remote and special localities, these methods are now not workable, and it was inevitable that machinery should be developed and employed.

Various machines have been produced for heading and gutting, among them the *Arenco*, developed by a Swedish inventor—Paul Danielsson. These high speed heading and gutting machines carry out the necessary operations with precision and at speeds of up to 180 fish per min. on herrings and pilchards, etc., and up to 300 per min. on sardines. The machines carry out the operations more efficiently than hand work, and have set a new standard for clean gutting.

The machines also embody features for removing the tail and for subdividing the herrings for more convenient canning. The operatives require no skill, as they merely rapidly spread the fish into the conveyor pockets of the machine. Instead of working in cold wet conditions and with bandaged hands, the operatives are within the protective walls of a warmed factory and can wear rubber gloves at their work. What used to be carried out by the "Fishergirls"—be they aged sixteen or sixty—is now better done by stainless steel mechanism, the fish being simply fed into the machine by any inexperienced worker. There has been talk of the machines taking away the livelihood of the "Fishergirls," but actually there are not enough "Girls" to go round, and moreover they welcome the machines, and the only strike on record since the machines were introduced, was by a body of workers who were dissatisfied because the other girls had the machines and they had not.



**High-speed seamer by Premier Filterpress Co.**



**Stainless steel blancher in the Scott-Rietz range.**

## Size Reduction, Heating and Cooking

In the Scott-Rietz range of equipment made by George Scott and Son (London), Ltd., there are four basic types of equipment: prebreakers, vertical and angle disintegrators, *Thermascrews* and blanchers.

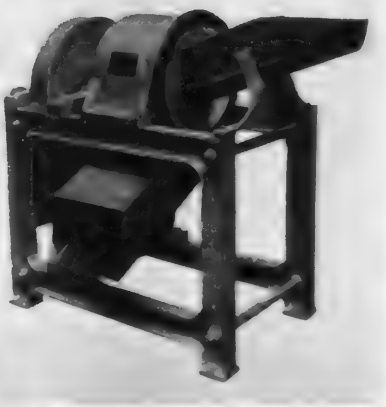
*Prebreakers* are heavy duty machines utilising high torque, low speed, and designed for particle size reduction in the large particle size range.

Fixed anvils are fitted in the body of the machine between which pass hammers fitted to a rotating shaft. Material caught between the anvils is subjected to the impact and compression from the hammers and sheared or crushed.

*Vertical Disintegrators* are heavy duty, high speed machines producing uniform particle size within the small or medium range. They can be fitted with integral prebreaker feeders to give preliminary treatment, or screw feeders where feed material is of an acceptable size. A vertical rotor is completely surrounded by a perforated screen which can vary according to the size of product required. Material resisting the action of the hammers is passed down the machine and discharged at the secondary outlet.

*Angle Disintegrators* have been specifically designed for hygienic conditions and maximum accessibility. The principle is broadly the same as in the vertical machine.

The hammers rotate in a plane 45° to the vertical and in close apposition to the screen. A secondary discharge is again incorporated and can be used to separate fibrous constituents from various vegetable materials.



## Slicing and Chipping

*Centrifugal slicing and chipping machine made by Brierley, Collier and Hartley, which is claimed to produce slices or chips at the rate of 3/5 tons per hr. "B.C.H.," who are well-known manufacturers of food machinery, are at present in the final stages of developing an onion peeling machine, which may also be adapted for peeling pears. They are also working on a machine for mixing diced vegetables.*

The *Thermascrew* is a continuous heating or cooling device with heating or cooling medium passing through a hollow screw and trough jacket. This affords the possibility of simultaneously conveying and heating or cooling.

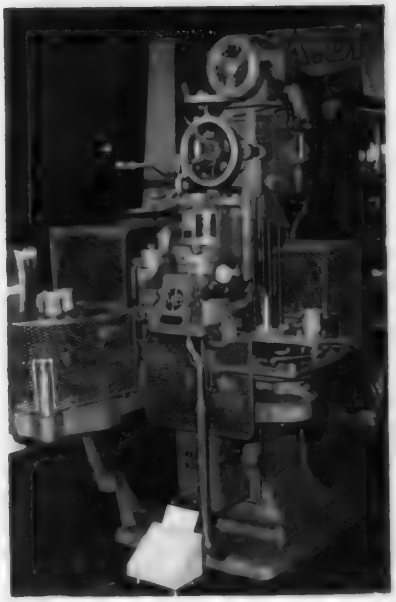
The *Blancher* is a continuous cooker employing open steam which is injected by jets disposed along the trough section of a screw conveyor. Continuous operation combines with accessibility, low power requirements, minimum space, to make this an attractive unit.

## Can Closing Equipment

It is well known that The Metal Box Co., not only supplies cans and ends to the food canning industry, but that it also manufactures and hires out the necessary closing equipment.

Among the equipment offered are two machines very familiar to the canning industry, which have been associated for years with the name of Metal Box; namely the M.B. No. 3-C Clincher and the M.B.9-A Double Seamer. The clincher automatically crimps the ends on open top cans before they go to the exhaust box, after which the seaming operation is completed on the 9-A Double Seamer. Both machines operate at between 60 and 85 cans per min.

More recent developments of considerable interest to canners include the M.B.6 Vacuum Double Seamer and the CR/C 334 Double Seamer. In the M.B.6, the cans are automatically seamed in a vacuumised closing head, and it will close up to 40 cans per min. The CR.334 is a high speed four-spindle rotating can seamer fitted for filler-seamer synchronisation, and can close between 130 and 200 cans per min. depending on the type of contents to be canned.



**Metal Box Co's. No. 6 vacuum double seamer in which cans are automatically seamed in a vacuumised closing head at the rate of up to 40 per min.**

The 3-C Clincher, the M.B.6 Vacuum Double Seamer and CR.334 Double Seamer are fitted with marker stations for embossing the ends before being fed on to the cans, and all machines are fitted with a "no can no end" device for controlling the supply of ends. Each seamer can be supplied with change parts for a number of sizes as required.

All this equipment is installed and serviced by the company, which also sells and installs container handling equipment of its own manufacture—such as runways and elevators—for fully automatic canning lines. Supplies of spare parts for all the company's machinery, whether hired or sold, are always available.

## Automatic Cooking

A large canning firm has now completed tests on a prototype process controller, made by the Cambridge Instrument Co., Ltd., for the large batch cooking of canned foodstuffs. As a result of these tests, the outfit has gone into full production. The instrument is fully automatic.

The retort is loaded with the canned

products to be sterilised and the chart set to the correct time. The timing cam is also set to give the desired length of cook and the temperature and pressure control arms adjusted to the required setting.

The remote push button is depressed and the control arm opens a steam valve. When a fixed temperature is reached, contacts operate the drain and vent relay, causing a flat valve to shut the drain valve. Up to this point any condensate will have blown out through the venting valve.

The temperature and pressure continue to rise until the correct settings are reached. After completion of the cooking period, the steam supply is interrupted and water and compressed air are admitted to the retort. A delay reservoir is included in the water valve air line to allow the compressed air to deal with the demand to maintain pressure.

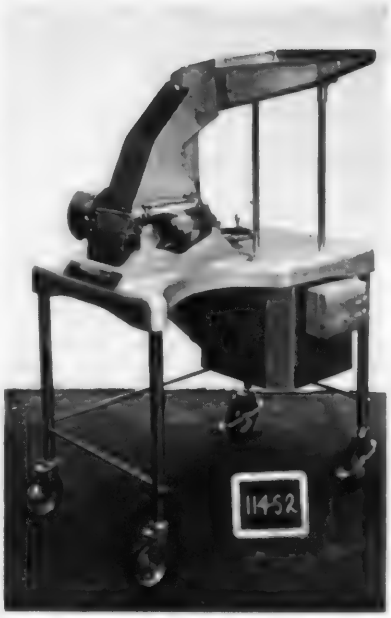
Once the water reaches a certain level, the compressed air is cut off, and the overflow valve opened. Cooling water continues to flow until the temperature is down to the required valve, when the cooling water valve is automatically closed.

At this instant, contacts complete a red warning lamp circuit, and a circuit to the vent and drain relay allows the retort to be emptied of water, prior to the removal of cans; after which the retort is ready for the next operation.

Special designs of the instrument casing allow the lower section containing the timing and control mechanism to be locked separately, leaving the chart accessible to the operator.

## Can Labeller

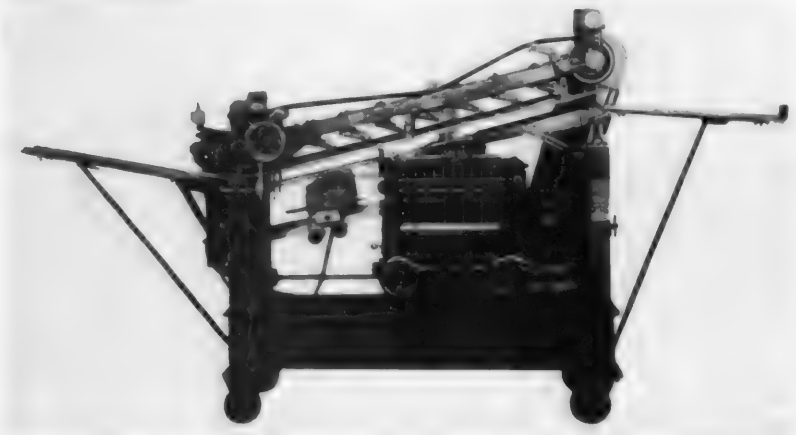
New features incorporated by the Purdy Machinery Co., Ltd., in their latest *New Way* can labeller (model "E.5"), include heavier components, a built-in elevator, a totally enclosed gum pot and an extra deep label bed.




**Apex comminuting mill No. 114 with underslung motor.**

The built-in elevator often eliminates the need for a separate elevator to raise the cans to a height suitable for feeding casing machines, while the enclosed gum pot is equipped with two thermostatically controlled heaters to give proper and uniform heating; the temperature being registered on an indicator on the operator's side of the machine, so that instant adjustment can be made as necessary.

The paste pot, equipped with a drain plug, is quickly and easily removed for cleaning. An added feature is that the paste belt does not actually enter the pot, but receives a narrow band of paste from a disc revolving in the pot, the amount of paste applied being accurately controlled as desired.



**Purdy's "New Way" can labeller which can apply at least 500 per min. It has a built-in elevator and a label bed holding 3,000 labels.**

## Comminuting Mill

The preparation of foods for canning is one of the main uses of the *Apex* comminuting mill, a type of swing hammer mill whose special advantages are claimed to be high production rates, low power requirements and minimum supervision. Its makers, the Apex Construction Co., Ltd., claim that it is suitable for the production of fruit squashes from whole fruit such as oranges, lemons, grapefruit and peaches, etc; the disintegration of meat, onions and other flavouring substances to small particle sizes with no loss of product or flavour; the chopping and pulverisation of vegetables for soups, meat sauces, etc.

The mill, which is motor driven and normally equipped with three speeds, consists essentially of a chamber, the lower part of which holds interchangeable screens. Through the chamber is a shaft carrying a rotor to which a number of swinging hammers are attached. The hammers have one face flat, with a pulverising action whilst the other has a knife edge to give a cutting action. Over ten different dual faced blades are available. The change from knife edge to hammer face is made by reversing the direction of rotation of the motor, and this involved the design of a universal type of feed throat with a Venturi throat having a central feed opening.

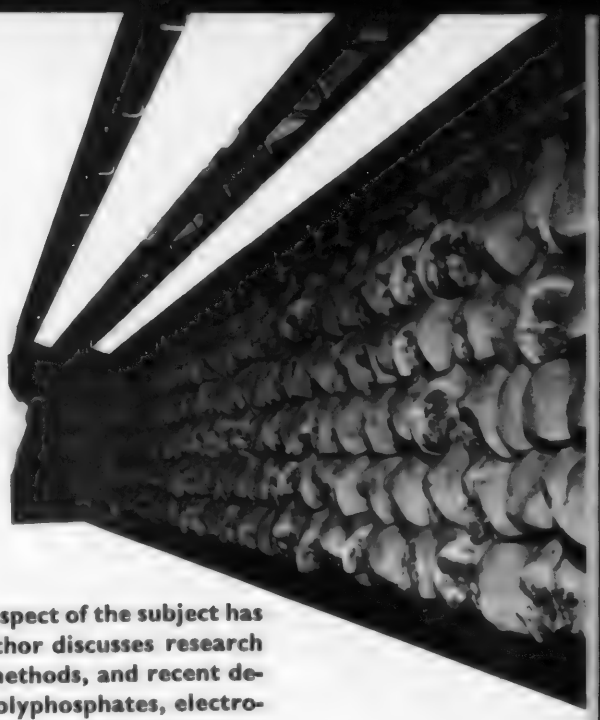
Material to be processed is fed from a pan over the feed throat to the blades and after passing through the screens is caught in receivers. The operation is completely dustless when dry processing due to the use of a special air filter.

The grinding chamber is built in two sections held together by swing bolts, the upper part forming the bottom of the feed throat. The chamber itself is held on to a base frame by swing bolts and wing nuts, so that it can be easily removed for cleaning and sterilising. Protective devices prevent the mill from being opened when the blades are being driven. The mill is constructed in stainless steel with all contact parts polished.

The high output is a result of the large screening area in relation to the volume of the grinding chamber compared with older versions of the hammer mill. The mill can also be water jacketted.

The mills are built in four general size ranges: model 214 (1½ and 3 h.p.) for laboratory pilot scale or small scale production which has an output of approximately 200-500 lb. per hr., model 114 (5 and 7½ h.p.), output 1,000-2,000 lb. per hr.; model 170 (10, 15 and 20 h.p.), output 3,000-5,000 lb. per hr.; model 180, (25 and 30 h.p.), output 7,500-10,000 lb. per hr. and above. Each of the above models can be provided with automatic screw feeder, rotary valve, powder feeders and vibratory feeders.

# ADVANCES IN MEAT CANNING



By Mogens Jul*

**Canned meat production has trebled since the war and every aspect of the subject has received careful attention. In this exhaustive review, the author discusses research on the condition of animals before slaughter, anaesthetising methods, and recent developments in meat technology. These include work on the polyphosphates, electrostatic smoking, heat processing methods, aseptic canning, storage and containers.**

WORLD production of canned meats in 1955 reached 920,000 metric tons — more than three times the pre-war figure. In 1938 canned meats formed 10% of the total of all canned foods. By 1953, this proportion had risen to 23%. The greatest rise in *per capita* consumption has been in the U.S.A., where 4·5 kg. of canned meat per head was eaten in 1953 compared to 1·2 kg. before the war. The next largest increase was in Canada, where consumption rose by 1·9 kg. to 2·5 kg. per head. In the same year British consumption reached 2·9 kg. per head: more than double the pre-war figure.

### Exports

The total volume of exports of canned meats has not changed much in the later years. On one hand, faster ships and better refrigeration have presumably reduced the need for canning as a means of preserving meats. On the other hand, meat canning seems increasingly to represent an effort to provide the consumer with foods that are ready prepared, easy to buy, and convenient to cook and use.

The proportion of canned meat production exported in 1938 was 55%. Ten years later it was 36%. Exports have been decreasing for some Latin American countries and Madagascar, presumably due to increased domestic meat consumption. Some other countries, also traditionally meat exporters, have increased their exports of canned meats, presumably following changes in the purchasing habits in the consuming countries.

* Danish Meat Research Institute.

### Imports

The pattern of imports has remained substantially the same for many years with the U.K. and the U.S.A. as the main importers. Venezuela has lately had a rapidly increasing import.

### Composition of production

Export figures show that production in New Zealand and the Argentine is based almost exclusively on beef. On the other hand, Denmark and the Netherlands base their meat canning almost entirely on pork products.

### Condition of animals before slaughter

It is being realised more and more that many of the problems in meat canning must be tackled in the breeding or feeding of the animals and in improving the condition in which they are slaughtered.

**Water retention.** The condition of the animal prior to slaughter is of importance for the water retention capacity of the tissue. This has been investigated by Government research workers in the U.K. and Australia, but mainly with regard to the effect of freezing.

Grau (1956) found in one experiment that feeding penicillin to pigs not only increased the yield but also the water retention of the hams in canning, and such hams were found superior in flavour. This effect has, however, not been found either by Clausen (1956) or by Patricia Mahon *et al.* (1956). This may be due to variations in the conditions under which pigs are raised in different countries.

**Two-tone hams.** This condition, which may also be called white muscle disease or white dystrophy refers to hams which, due to a condition of the muscle tissue, do not show proper colour formation during the cure. The light parts of the meat also very often show poor water retention. The difficulty seems to stem from the condition of the animal prior to slaughter. Thus Ludvigsen (1955) has shown that the frequency is almost doubled in the summertime, presumably due to overheating and fatigue of the animals

during transport to the slaughterhouse. The affected parts of the tissue show abnormally low *p*H values immediately after slaughter. The condition is not always easily diagnosed, and it appears that several factors are involved.

**Anæsthetising of pigs.** Most European countries are now anæsthetising pigs prior to slaughter. Three methods have so far been adopted. Electric stunning, shooting and carbon dioxide anæsthetising (see FOOD MANUFACTURE, May, p. 230). Shooting is used to a certain extent, especially in Germany. It is believed, however, that it quite frequently causes blood splashes in various parts of the meat.

Electric stunning is being used in many places, and quite extensive investigations were carried out on that subject in Denmark. This showed that it is of great importance that the animal be stuck not later than 5 sec. after the termination of the application of the current. If this rule is not adhered to, blood splashes may occur in the flesh. They were found in from 0·5 to about 5% of the pigs with a time lapse of about 30-45 sec. between termination of stunning and sticking. When it was reduced to 5 sec., no splashes were found in 500 pigs. Commercial operations have proved this to be a great improvement. The blood splashes are harmful first because they make a certain proportion of the meat unsuitable for canning, at least as whole pieces such as hams or shoulders. Even worse, however, it is often not possible to detect the splashes when the meat is prepared for canning. Thus, the damaged meat may reach the customer and may cause suspicion with regard to the wholesomeness of the animal from which the meat was obtained.

Danish investigations indicate that electric stunning, even with the improved technique, causes a somewhat higher frequency of pigs with a high *p*H in some of the muscles during rigor. This gives rise to the suspicion that the meat may be more exposed to microbiological breakdown and that therefore the frequency of spoilage may tend to increase where electric stunning is used.

Investigations in the United States and Denmark have shown $CO_2$ stunning to be a more satisfactory method from a technological point of view. There is no lung bleeding which constitutes a serious inconvenience in electric stunning. In addition, the animal is easier to handle throughout the slaughtering process, since the muscles are in a more relaxed condition. Last, but not least, blood splashes are eliminated completely and the condition of the meat seems similar to that of non-stunned animals. Due to these findings, several $CO_2$ anæsthetising installations are currently being built in various countries, particularly in Denmark.

**Table 1. Canned Meat Exports (1,000 m.t.)**

| | Pre World War II | 1948–50 | 1954 | 1957 |
|---|---|---|---|---|
| *Countries showing increase* | | | | |
| Netherlands | 10·1 | 19·4 | 51·0 | 50·0 |
| Denmark | 4·0 | 15·5 | 46·0 | 52·0 |
| Australia | 4·0 | 45·0 | 66·7 | 60·9 |
| Germany, Western | 0·9 (all Germany) | — | 9·9 | 9·0 |
| New Zealand | 3·3 | 5·8 | 3·0 | 15·6 |
| Ireland, Rep. of | 1·3 | 7·0 | 12·9 | — |
| *Countries showing decrease* | | | | |
| Mexico | — | 25·8 | — | — |
| Brazil | 17·0 | 12·2 | 0·5 | — |
| Paraguay | 3·0 | 9·2 | 0·8 (1953) | — |
| Uruguay | 32·8 | 17·9 | 22·1 | 5·1 |
| Madagascar | 3·9 | 5·7 | 1·8 | — |

**Table 2. Value of Canned Meat Exports in per cent of Total Exports (1953)**

| Argentine | Australia | Denmark | Ireland | Netherlands | New Zealand | Uruguay |
|---|---|---|---|---|---|---|
| 9·3 | 2·6 | 4·0 | 3·4 | 2·6 | 2·0 | 2·0 |

**Table 3. Imports of Canned Meats (1,000 m.t.)**

| | U.K. | U.S.A. | Venezuela |
|---|---|---|---|
| 1934–38 | 71·0 | 34·1 | 0·9 |
| 1948–50 | 116·9 | 60·5 | 5·2 |
| 1955 | 192·2 | 87·3 | 11·7 (1953) |

## Technology

Few, if any, spectacular developments have taken place in the technology of meat canning, which is still something of a craft industry and appears to be difficult to adapt to mechanisation. Much effort is, however, today being spent on the technological development of the industry.

**Machinery.** The machinery for meat plants has seen considerable technical improvements. For instance, many self-emptying cutters and filling machines have been introduced. Recently, a German and a British manufacturer introduced a sausage filler with continuous feed. A great deal of interest in these machines has been shown.

The extended use of vacuum mixers, vacuum chambers, and vacuum closing machinery has been of great advantage to the canning industry. By their use, discoloration of the meat is often prevented and a greater uniformity with regard to specific gravity is obtained. This is a great aid in the effort to standardise meat cans. Improvements in yields have also been reported.

**Preparation of the meats.** In the U.S.A. quick cures, especially for pork, have been developed. They are based on salting at high temperatures with the addition of ascorbic acid which, under certain conditions, greatly improves colour formation during the cure. The process is not used to any large extent in canning, but mainly for ready-to-eat meats.

At the 1956 Congress of the Institute of Food Technologists in the U.S., workers from Florida State University described work showing that cystein, glutathione, as well as ascorbic acid, protects the colour of cured meats, cystein having a much more pronounced effect than ascorbic acid, while workers at the Missouri Agricultural Experiment Station found a very marked effect of ascorbic acid.

**Polyphosphates.** A very important development within the last 5 years has been the extensive adoption of the use of polyphosphates in meat curing. The effect of these additives has been under close scrutiny with regard to their mode of action and the possible undesirable effects they might imply.

Polyphosphates are mainly used for stabilising the emulsion in sausage manufacture and for checking cooking loss during canning of hams and other meat products. Furthermore, phosphates seem to improve the general quality of these products. The improvement seems to be effected in three ways:

1. Being mildly alkaline compounds, polyphosphates raise the *p*H of the meat and thereby increase its water retention capacity.

2. The polyphosphates contribute to the salt concentration of the meat, which results in increased water retention.

3. Polyphosphates have the ability to bind bivalent cations such as calcium and magnesium in complexes which are so strong that these ions are released from the peptide chains. As these cations are believed to curtail the swelling of proteins, the polyphosphate action will increase the water-binding capacity (Hamm and Grau (1955)).

A certain part of the effect may, however, stem from the fact that polyphosphates can split the contractile substance in the meat, acto-myosin, into actin and myosin (Bendall (1954)).

Some concern has been expressed about the possible harmful effects of polyphosphates. It has been shown (Gerritsma and Frederiks (1954)) that polyphosphates are not completely hydrolysed during cooking. Leading health authorities, for instance, in the U.S., are, however, satisfied that the use of polyphosphates in amounts not exceeding 0·5% of the meat content in canned meats does not constitute any danger to health.

**Table 4. Composition of U.K. Canned Meats imports in recent years (1,000 m.t.)**

| | |
|---|---|
| Beef, corned and other ... ... | 80 |
| Ham, bacon and other products ... | 40 |
| Other or mixed products ... ... | 20 |

**Table 5. Composition of Danish Canned Meats Exports in recent years**

| | *Weight* (1,000 *m.t.*) | *Value* (*million U.S.* $) |
|---|---|---|
| Hams ... ... | 16 | 24 |
| Chopped pork products ... | 20 | 14 |
| Other or mixed products ... | 8 | 6 |

**Electrostatic smoking.** Companies in the U.S.A. have adopted electrostatic smoking for meats. In this process the meats are taken through a continuous smoking apparatus, the first section of which consists of an infra-red drying section where superficial drying is carried out. Then the meat goes through the smoking chamber where a high voltage is placed on the meat. Metallic electrodes in the chamber are the positive electrodes. The smoke particles are then very quickly and uniformly deposited on the surface of the meat. From this the material passes another drying chamber similar to the first one. It is stated that the smoking is not quite as satisfactory from a taste point of view as traditional smoking. It gives, however, a considerable saving in time and less shrinkage.

Some interesting results have been obtained with smoke generators of the friction type.

**Containers.** Much work has gone into the development of cheaper or better containers for canned meats. The extended use of phosphates has caused some additional corrosion problems. In America a patent has been issued on a method for attaching an aluminium electrode in a can. It has been claimed that its presence will prevent corrosion of the can itself, irrespective of whether phosphates have been used. Commercial experience with the method is limited at present, but favourable results have been reported. A technological development has been the extended use of rectangular cans in Europe and of tapered low cans, particularly for meat pies in Britain.

**Plastic containers.** Lately, films have been produced which appear sufficiently vapourproof and heat resistant to permit their use for canned products. The process has so far been used only experimentally for meats.

**Sticking to the can sides.** It is very difficult at times to prevent such products as luncheon meat from sticking to the can. In America, non-sticking enamels have recently been developed and may prove of great value to the meat industry.

Other companies attempt to solve the problem by spraying the cans inside with a lard emulsion prior to canning. This seems to work.

**High-frequency soldering.** In Europe large size cans for hams are generally soldered in order to ensure a tight closure. This was previously done by hand, but it is now often done by high frequency. This makes the manufacturing process much more convenient and is a considerable saving in labour. In North America, such cans are normally vacuum sealed only.

**Air cooking.** A Swedish company has been working on the development of air-cooking equipment for heat processing of canned foods. So far no information is available with regard to the prospects of using such cooking methods in meat canning.

A German company has developed an air-cooking cabinet which has proved to be very useful in sausage manufacture. The cabinets may also be used for certain types of canned hams, but do not exhibit any particular advantage over other cooking equipment.

**Water cooking.** The cooking of hams is still a very difficult pro-

cess. At a microbiology symposium in Lille (Le premier Symposium, 1954), it was agreed that hams are best cooked in water, which is circulated, for instance, by an air jet. In North America, however, circulating pumps are being advocated.

**Rotation during heat processing.** It is well known that heat penetration is a great problem in meat canning since meats are easily overcooked. Therefore, any measure that may improve the speed of heat penetration is very valuable. Blair and Swartz in the U.S. have given some interesting details regarding experiments with end-over-end rotation of canned meats during heat processing (Tischer, Blair, and Petersen, 1954). In Germany, much experimentation has been carried out following earlier works by American Can Co. and Continental Can Co. with end-over-end rotation of the cans during processing, similar to what has long been used in milk canning.

Rievel and Reuter (1955) and Reuter (1954) have found that the process is of little importance for solid meats as might be expected. It may, however, result in considerable savings for other meats. For corned beef 50% of the cooking time may be saved. Similar savings have been found for pork in juices. For various ready-cooked dishes such as stews 60 to 70% saving in heating time may be obtained.

It appears that savings in cooking time may be realised even for some solid products, namely when they contain parts that will become liquid at cooking temperatures, for instance comminuted meats containing fats. The process is also useful for liver paste, where savings in cooking time have been about 70%. In all cases it was found that the taste was much improved.

The experiments indicated that the speed of rotation should be approximately 30 to 40 rev. per min., which means that the centrifugal force will be strong enough to counteract the gravity.

**Stratification.** Experiments by C. O. Ball seem to indicate that better heat penetration may be feasible by heat processing a stratified rather than a mixed product (Tischer, Blair, and Petersen, 1954). No news has been published regarding possible commercial applications for meat products.

**Automatic retort control.** Many factories have installed automatic controls on their traditional autoclaves. While this is also a purely technological improvement it does ensure much more uniform cooking, and constitutes a considerable saving in labour.

**Continuous retorts.** The meat canning industry, particularly in Europe, is harassed by a great number of different can sizes and shapes. This makes the use of continuous retorts difficult. It does appear, however, that such retorts, particularly of a type which will take a somewhat greater variety of can sizes may be used more and more extensively.

**High-frequency cooking.** Much experimentation has been carried out with high-frequency cooking of canned meats. So far the process is not known to be used commercially.

The advantage of using high-frequency heating, for instance in ham canning, is very obvious. If it were possible by this means to arrive at a uniform heating throughout the can, great improvements could be made in the cooking and a safer product could be obtained. By conventional cooking methods the outside of the ham is, of course, greatly overheated in order that the interior of the can may attain pasteurising temperatures.

It is generally considered that the efficiency of such heating will be about 50%. Since the cost of electric current will practically always be higher than the cost of heat in other forms, this may make the process fairly expensive. Doty, Niven, and Pircon found in experiments at the American Meat Institute Foundation that the flavour and texture of luncheon meats were improved by high-frequency cooking. They estimated that the cost would be 0·6 U.S. cents. per lb. of meat as compared with 0·2 to 0·3 U.S. cents by traditional steam processing (Tischer, Blair, and Petersen, 1954).

**Aseptic canning.** Since aseptic canning is particularly suited for liquid products it has not been used to any great extent in meat canning. However, it appears that for certain meat products it might be of definite advantage since the bacterial destruction increases far more with the temperature than does the cooking effect. The process has been in semi-commercial use in America, where potted meats, hamburger meat, creamed beef, and liver soup were sterilised in a Votator type heat exchanger and subsequently put in cans (Tischer, Blair, and Petersen, 1954). Progress in the technical aspects of this field has been notable.

**Outside corrosion of cans.** Particularly retorting in water will often cause corrosion of the exterior of tin cans. Improvements have been obtained by adding chromates or phosphates to the retorting water. It appears, also, that attaching a sacrificial aluminium electrode to the retort baskets may be of some use. The problem is, however, still important for all canned products, and needs further investigation.

**Storage of canned hams.** Many canned meats have to be kept under refrigeration. Recent investigations in Denmark have shown that the usual 6-10°C. (43-50°F.) is not sufficient to ensure optimum keeping quality of, for instance, canned hams. Some non-spore-forming bacteria present in hams may develop slowly at temperatures as low as 4°C. (39°F.). Therefore, a storage temperature of 0°C. (32°F.) is recommended in American literature. In South Africa, storage below 4·5°C. (40°F.) is prescribed. Such low temperatures will also improve the flavour after prolonged storage.

**Auxiliary materials.** Since meat products are difficult to sterilise, much attention must be paid to the possible contamination of any product which is added to the can. Thus, most countries have set up

**Preparation of hams for canning.**

standards for the spices and gelatine to be used in canning.

**Sanitation.** Lerche (1955) has shown that it is not desirable to brush cured hams with hot water prior to canning, since this will increase the bacterial count. He recommends washing in running hot water.

**Research and education**

**New institutes.** The meat industry in most countries has been hesitant in embarking on research programmes. This situation appears to be changing. The Danish bacon factories recently opened a research institute for research on slaughtering, curing, and canning in Roskilde. A group of Finnish co-operative slaughterhouses opened a similar centre in Haemeenlinna. Both organisations include programmes for the training of the factory personnel. The German Bundesanstalt für Fleischwirtschaft in Kulmbach has been greatly expanded in personnel. At the National College of Food Technology in London, a course in meat technology has been extended.

**Microbiology.** The microbiology of meat canning seems considerably more complicated than the microbiology of other canned products. Since meats with low heat conductivity are so easily overcooked, cooking has to be kept within definite limits. This means that most of the finished products of mild cured meat may contain viable spores, and that the heat processes at times have to be calculated on the basis of the heat resistance of bacteria, not of spores as in most other products.

Most bacteria will be prevented from developing by the *p*H and some of the various chemicals such as nitrite, nitrates, salt, etc., in the meat.

These chemicals may also lower the heat resistance of the bacteria. The interrelation of all these factors still has to be investigated.

At the symposium on the microbiology of semi-preserved meats (Le premier symposium, 1954), in Lille, it became evident that much work is currently being done in this field which is one of the most important for meat canning.

**Nutritive value of canned meats.** At a symposium at Svenska Institut et för Konserveringsforskning (1956) Cremer described some experiments by Beuk, Chornock, and Rice (1949), who heated homogenised meat in sample cans for from 5 min. to 24 hr. at 113°C. (235°F.). Even 5 min. heating showed a decrease in nutritive value on rats, and after 24 hr. the protein value of the meat was almost lost. It seems that heating may cause changes that make the essential amino-acids inaccessible. Little further is known about this aspect. It is known that the digestibility of the meat is only little affected by the heating. This problem is in need of further investigation. That important nutritional problems still exist in meat canning, was brought out also by investigations by the Surgeon-General of the U.S. armed forces (Tischer, Blair, and Petersen, 1954).

Danish investigations by Ege have compared the thiamine content in 2 lb. canned hams with that of home-prepared hams. The latter showed complete retention, while the thiamine of the canned ham was reduced to about 80%.

In sausages such as Frankfurter and Vienna sausages, the retention was about 50%. It was found, however, that approximately 50% of the remaining thiamine was found in the brine in the can, and thus would be of no nutritional value unless the brine was used.

In luncheon meat Ege found a retention of about 50%. No information is available on the retention in these products, when they are prepared in the home.

Greenwood, Kraybill, Feaster, and Jackson (1944) have previously shown that thiamine destruction increases with temperature at a much lower rate than destruction of bacteria. This consideration has in later years led to considerable effort to increase processing temperatures, when possible.

Farrer (1955) attempted to plot the various data on thiamine destruction in meat to indicate the time-temperature relationship which may be used in the calculation of the effect of various heat processes on the thiamine content of the meat.

There is a definite need for further investigation into thiamine retention questions, for this reason also, that thiamine is rather unstable. Therefore, if a high retention of thiamine is obtained, it may be reasonable to assume that other nutritive values have also been better retained.

**Quality control.** Many exporting countries maintain a quality control of their products. Germany introduced a government quality control in 1951. Other countries, for instance the Netherlands and Denmark, have had voluntary controls of similar nature for several years.

### Development of competitive processes

**Prepackaged fresh or cured meats.** The sale of prepackaged fresh or cured meats is increasing very fast, especially in the U.S. Recently great progress has been made in the development of better films for such purpose and in vacuum - closing equipment for plastic bags and wrappers. A new venture is the development of plastic flavourless coatings which may be even more attractive from an economic angle. The process, however, is in the experimental stage only.

**Frozen meats.** Sales of consumer size packages of frozen fresh and cured meats is also increasing very fast. In the U.S. it is estimated that 20 to 50% of all meats may be handled in this way by 1970. The sales of frozen meat in retail packages in the U.S. was 12,000 metric tons in 1955, 21% more than in 1954, and about one-tenth of the sales of canned meats.

It appears, however, that both forms of prepackaged food should be considered a new development in the methods of marketing fresh meat, and they are not likely to affect consumption of canned meats.

**Preservation with antibiotics.** Much has been said about the use of antibiotics in food preservation which at times has been depicted as the method which may soon make all other methods of meat preservation obsolete. There is little reason for this assumption. Antibiotics have proved to be of considerable use in prolonging the shelf life of fresh poultry. Similarly, it appears that they may well be used for such products as fresh, iced fish. Since antibiotics, however, appear not to be very stable in meats, it does not seem possible to obtain a substantial increase in the keeping quality of fresh meats by their use. It may be somewhat more difficult also to approve their use for meats than for fish or poultry since the cooking temperature of meat in the home may be more doubtful. It is not unlikely that if their use is approved, it may rather be as a method of controlling bacteria in the various steps during the preparation and canning of the meat. So far, no results are available regarding such use.

**Radiation, Sterilisation, or Pasteurisation.** Similar claims have been made for irradiation as for the use of antibiotics. It appears that in sterilising meats by radiation such doses must be used that the result is generally an off-taste in the meat. An interesting detail is seen in the fact that ascorbic acid and nitrite will tend to reduce such off-tastes. This may make the process somewhat easier to use for cured meats which often contain both these ingredients.

The American Can Co. has studied the effect of gamma irradiation of beef, cured luncheon meat, and hams, stored for three years in cans. All showed significant off-flavours, many, but not all, of enzymatic origin.

Since, however, large doses are required to bring about sterilisation and enzyme inactivation, it does not appear that this process is likely to replace canning. Pasteurising by irradiation is more likely to be used as a means of prolonging the shelf life of fresh or cured meats kept under refrigeration.

### Future outlook

As mentioned above, other forms of preservation are not expected to reduce the possibilities of the meat canning industry. On the contrary, it seems that the tendency towards increased sales of ready-to-cook foods will lead to a much larger canned meat production.

Canning of meat is, however, much more difficult to carry out than the canning of many other products, mainly due to the thermolability of the flavour and texture of meat and most meat products.

For this reason, much research is needed in the whole field of heat resistance of bacteria, nutritive value, flavour, and water retention. It appears that one of the aims of meat research should be to develop temperature resistance curves for all these factors in various meats, and to investigate their relation to the presence of salts, nitrite, and other food additives.

It appears that the meat canning industry has a particularly promising field in development of more ready - to - cook prepared foods. A great development has taken place in the U.S. in soups, spaghetti, and meat stews, chili con carne, etc. Much investigation is needed to make such ready-to-eat products more palatable, overcoming the thermolability of the various ingredients.

C. O. Ball has suggested that more extensive use of pasteurised canned meats for products to be kept under refrigeration might be a solution to some of the above problems. With the extended use of household refrigerators it seems that more such products could be introduced. This would have to be preceded by a public information programme to assure the proper use of such cans in the homes, and such packages would probably have to be specifically marked to indicate their perishability at higher temperatures.

#### Acknowledgments

The author wishes to thank all the many organisations and persons who have assisted in collecting the above data. Especially with regard to the statistical data, very valuable assistance has been given by Mr. Fox, Secretary-General of the International Tin Study Group. All statistics have been carefully checked and supplemented by Mr. Habjanic of the Economics Division, FAO. Without the generous assistance of these and of many other individuals, it would not have been

(*Turn to page 279*)

# BACTERIOLOGY OF CANNED FISH—1

By Hans Riemann*

**The bacterial causes of spoilage in canned fish, their detection, and the examination of cans are reviewed in this article. The author stresses that as it is usually impracticable to detect low levels of spoilage by incubation tests, more emphasis should be laid on control of the seaming operation, raw materials and heat processing.**

LIVING bacteria may be present in canned fish (in this paper "canned fish" indicates heat processed canned fish) and other canned foods for two reasons: (1) heat resistant types have survived retorting, and (2) bacteria have gained access to the can through a leakage after processing; the leakage is most often caused by faulty seaming, but sometimes pinholes resulting from rust or corrosion may be found in the can. Multiplication of bacteria in the contents usually results in a more or less pronounced spoilage.

Dead bacteria are always present in canned foods, but only in small numbers in most organoleptically sound products. If dead bacteria are present in large numbers they will usually be accompanied by spoilage. In such cases the bacteria have multiplied in the product. Multiplication may have taken place in the raw material or at an intermediate stage of production (the so-called preprocess spoilage), and the bacteria may eventually be killed during processing. In other cases multiplication has taken place after processing, the resulting bacterial population eventually dying out during storage (autosterilisation). Autosterilisation is more common in cans containing sporeformers only than it is in leakers.

### Types of bacteria in spoiled canned fish

Bacteria which infect the can through a leakage (post-process infection) constitutes a mixed flora containing cocci, gram negative rods, and other types in varying numbers. The infection usually takes place during can cooling immediately after processing. If the cooling water has been chlorinated so that most vegetative cells are killed, the infective flora may consist solely of spores.

Bacteria which survive retorting are limited to a few species of heat-resistant sporeformers. Baumgartner[1] surveyed the literature concerning the principal spore-forming spoilage organisms in canned fish and other canned foods.

The most important species seem to be mesophilic anærobes (*Cl. sporogenes, Cl. putrificum*) producing putrid swells, and mesophilic ærobes, Bacillus species, producing flavour and colour changes and softening of the content. Some Bacillus species may produce swells. Thermophilic Bacillus species producing "flat sours" have been recorded,[2] but obligate thermophilic "flat sour" organisms seem to be rare in canned fish.

Norwegian examinations of large numbers of incubated cans of fish and meat products[3] showed that bacteria producing a type of spoilage similar to "flat sours" was most often present in under-processed cans.

50% of isolated species were *B. coagulans*.

25% of isolated species were *B. circulans*.

25% of isolated species were *B. circulans* and *B. alvei* intermediary types.

Next in order came putrid swells. Of the isolated strains 83% were *Cl. parasporogenes* and 17% *Cl. sporogenes*.[4]

A minor group of hard-swelled cans contained only acid and gas producing *Bacillus spp.*

64% were *B. subtilis*.

21% were *B. macerans*.

15% were *B. subtilis* and *B. alvei* intermediary types.

Investigations in Denmark showed *Cl. sporogenes* to be present in almost all cans of examined spoiled fish. Bacillus species were rare. The cans examined in Denmark had in most cases been stored at normal temperature (15-20°C.) before examination, while the cans in the quoted Norwegian investigations were incubated for 10 days at 37°C. before examination.

### LABORATORY EXAMINATION OF CANNED FISH

The purposes of laboratory examination of canned fish may be listed as follows:

(*a*) Could the content of the can have given rise to bacterial food poisoning?

(*b*) Is the content of the examined cans fit for human consumption and of normal keeping quality?

(*c*) Is the spoilage due to (1) preprocess bacterial growth (spoiled raw material), (2) under-processing, (3) leakage?

(*d*) Is the lot from which the examined cans are drawn safe for human consumption and of normal keeping quality?

Point (*a*) is connected with investigations of epidemic outbreaks of food poisoning and will not be considered further. Points (*b*) and (*c*) will be considered together. Point (*d*) will be discussed in a separate paragraph. The examination methods connected with (*b*) and (*c*) will be treated first.

*Incubation.* Most canned fish products do not contain curing agents or other bacteriostatic compounds in concentrations inhibiting spore germination and growth. Fish products are of the low acid type (*p*H above 4·5). Most types

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of canned fish are good bacteriological media compared with those ordinarily used in the laboratory. This is corroborated by the fact that it is seldom possible to find bacteria by sub-culturing from cans not showing bacteria microscopically after incubation.

The most common incubation temperature is 55°C. for thermophilic spores and 37°C. for mesophiles. The last temperature, however, does not seem to be ideal.

Williams and Reed[5] found a greater rate of swelling by incubating cans at 30°C. than at 37°. The incubation time is also important. A number of factors influences the germination rate as well as the maximum number of germinated spores (composition of medium addition of carbon dioxide and soluble starch, heat activation, etc.). Table 1[6] shows the results from incubating at 35°C. cans with fish balls inoculated with *Cl. sporogenes* spores. It is seen that even among cans given 80-100% of the processing value necessary for reducing the numbers of surviving spores to less than one per can only 56% swelled during 2 weeks incubation at 35°C.

In practice it is ordinarily not possible to keep cans in an incubator for several months. It is best to keep the cans as long as possible at 30°C. before examination, and always state the incubation time when reporting the results.

For thermophilic spores 4 days incubation at 55°C. may be sufficient since obligate thermophilics show little tendency to dormancy.

**Table 1. Swelling of canned fish balls during incubation at 35°C.**

Blown cans in percentage of the total number of cans which blew in 12 weeks.

| Processing value | 1 week | 2 weeks | 4 weeks | 8 weeks |
|---|---|---|---|---|
| 80–100% ... ... ... | 12 | 56 | 92 | 100 |
| 50–100% ... ... ... | 31 | 67 | 90 | 100 |

### Incubation

Blown cans or cans known to be spoiled without swelling are examined without pre-incubation. Other cans should be incubated as discussed above. Before examining, a visual examination is made of the mechanical condition of the can. Swelling, quality of seam, pinholes, etc., and code marks are noted.

### Opening the can

If dirty the can should be cleaned with soap and water before it is opened. A warm solution of a quaternary ammonium compound is also efficient for cleaning. The can must be dried and flamed before opening. Drying is most conveniently done by wiping the lid of the can with ethanol. It is flamed by slow rotation over a Bunsen burner. It is not sufficient just to burn off the alcohol remaining on the lid. A simple sharp-pointed steel rod with a diameter of 1-2 cm. seems to be one of the most convenient piercing instruments. It may be equipped with a circular flanged shield.[7]

Cheftel[8] has described how spurting can be avoided by puncturing the can through a large sterile glass funnel. The can is placed in a tray containing a disinfecting solution. A simple method is to soak absorbent cotton in 1% sodium hypochlorite solution pressing the cotton as dry as possible by hand and keeping it around the flamed steel rod when puncturing the can. The cotton is left on the can to prevent contamination through the hole until inoculation of the bacteriological media has taken place.

### Sampling from the can

Sterile cotton plugged cork borers or glass tubes can be used to remove a cylinder from the centre of cans of solid packs. The cylinder is expelled with a rod into a sterile petri dish where it is cut into small pieces, which are inoculated into the media by means of sterile forceps. Some prefer to emulsify the sample with sterile saline and inoculate the media with pipettes. When utilising cork borers on glass tubes for sampling it is necessary to use a new one for each can. A simpler method is to sample with a sharpened steel spatula and forceps. These instruments can be easily cleaned and flamed between two cans. The size of the inoculum is usually from 1 to 2 g.; this material should be taken from the centre as well as from the surface of the can if it is of the solid pack type. Liquid is sampled with a sterile pipette. The inoculation of media from cans must be done as quickly and with as few movements as possible in order to avoid contamination from the air.

To detect air contamination, sterile control plates should be treated as the inoculated media. *Sterilamps* may sometimes provide good assurance against air contamination.

If bacteria are found to be present in the cans, it is often desirable to get at least a rough estimate of their numbers. A convenient method is to mix about 5 g. of the content in the sterile jar of a mixer or similar instruments with sterile saline. Thereafter dilutions are made in the ordinary way.

### Culture media

A number of different media have been proposed for the examination of canned foods, *e.g.* Tanner.[9] The choice of media is not very critical as long as ærobic and anærobic media supporting good vegetative growth are used. If one wants to detect dormant spores, however, special precautions must be taken because anærobic germination is very much influenced by a number of factors. Barnes and Ingram[10] have shown the importance of the redox potential. The clostridia may grow without a lag at Eh = −45 mV., and the lag phase increases with increasing Eh. It has repeatedly been shown that germination of heat-treated anærobic spores is enhanced by the presence of soluble starch,[11] and that addition of sodium bicarbonate ($NaHCO_3$) also speeds up germination of several anærobes.[12, 13] Detailed information concerning the influence of the surroundings on germination of spores, especially slow germinating ones is, however, meagre.

The detection of dormant spores

(bacteriological sterility test) in canned fish, which usually seems to offer germination facilities as good as most laboratory media, is therefore a rather doubtful business.

Baumgartner[1] suggests the following media for low acid foods. Dextrose tryptone broth incubated at 37°C. and 55°C. for ærobes and liver broth incubated anærobically at the same temperatures for anærobes. Since incubation in an oxygen free atmosphere is often inconvenient, it is common to provide for anærobiosis by adding a certain amount of minced liver to the tubes and steaming them for 20 min. before inoculation. Anærobic conditions may be maintained by covering the medium with a seal of *Vaseline* or sterile 3% agar. Baumgartner suggests additional cultures comprising broth and agar for spoilage investigations. We have found deep brain (equal amount of trimmed, minced ox brains and tap water to which is added 2% neopeptone) to be a good routine medium. The medium is filled in tubes in such a way that a 5 cm. high layer of brain tissue is formed. It is inoculated in the deep, and it is not necessary to cover with *Vaseline* or agar in order to provide anærobic conditions. The redox potential is below −20 mV. The deep brain medium permits the growth of most bacteria found in canned fish, and we have found it equal or better than other media, including liver broth, skim-milk, pork infusion broth, and RCM medium[28] with regard to anærobes. It also permits sporulation of anærobes in the presence of *Str. fæcalis* and *Bacillus*, even high acid forming strains of *Str. fæcalis* seem to be unable to lower the *p*H of the medium so much that clostridia will not sporolate. As a precaution against low *p*H, 1% finely powdered calcium carbonate can be added to the medium and mixed intimately with the brain particles.

It is not known if sporulation is prevented by nisin producing *Str. lactis*. However, general experience shows that growth and sporulation of clostridia take place in the presence of most mixed cultures in this medium.

Most ærobic spore formers will also grow in this medium, and no other liquid medium seems to be necessary for routine examination of canned fish. As obligate thermophiles have never been found in Danish canned fish, it has been our custom to incubate the inoculated media for 4 days at 37°C. only. In special cases corn liver medium might be used for thermophilic anærobes, sulphite agar for $H_2S$-forming anærobes, and tryptone dextrose agar for "flat sours" and similar organisms.

After inoculating the brain medium, a petri dish is inoculated and poured with agar, preferably nutrient blood agar. The petri dish is incubated at 20°C. for 4-5 days. This solid medium is very convenient for detecting leakers. The control plates are treated in the same way as the petri dish with blood agar. After incubation of the media the cultures are examined visually and microscopically. If necessary, spore formers may be detected by heating the brain medium at 80°C. for 20 min. The presence of ærobic spore formers may then be detected by streaking from the heated medium on blood agar plates; anærobes may be detected by inoculating a modified Crossley milk medium[14] made by adding 10 ml. of skim-milk containing 1% peptone to tubes containing 2-3 g. of sterilised codfish meat. The tubes are retorted at 110°C. for 20 min. and kept in an incubator for sterility test. Another useful milk medium for detecting—and to a certain extent classifying—anærobic spore formers is skim-milk with cystein.[15] These milk media may be made inhibitory to Bacillus species by the addition of $NaN_3$ (sodium azide). When growth is obtained in the inoculated media it is desirable—especially if no organoleptic changes have taken place and no bacteria were detected microscopically in the product—to make a rough estimate of the number present. This may conveniently be done by inoculating 10 fold dilutions in brain medium and on plates. Anærobic spore formers can be detected by heating the brain medium as suggested above and subculturing an anærobic milk media. Alternatively, a medium permitting a—to some extent specific—anærobic spore count as suggested by Mossel *et al.*[16] may be used. This permits more accurate counts provided that not too many other anærobically growing bacteria are present. However, very accurate counts are unnecessary, and the described dilution count using brain medium with subculturing in milk media after pasteurising has an advantage, because sporulation of few anærobes might be detected even in the presence of many non-spore formers. The milk media may further be rendered inhibitory to Bacillus species by the addition of sodium azide. Other media providing good sporulation may of course be substituted for brain medium. Counting anærobic spore formers in canned fish products is probably seldom troubled by the presence of non-spore formers. Canned fish is processed to such a degree that non-spore formers very seldom will be present even in a case of pronounced under-processing. Non-spore formers are present in leaky cans, but it is very unusual that a leaky can is also underprocessed, which can be seen from the following reasoning. If, in a lot of cans, the percentage of underprocessed cans (spoiled) is 5 and the percentage of leaky cans is also 5, the probability of getting a can which is underprocessed as well as leaky will be

$$\frac{5}{100} \times \frac{5}{100} = \frac{25}{10{,}000}$$

or 2·5% of the *spoiled* cans. The basis for this reasoning is that leakage and underprocessing may be regarded as being independent of each other.

**In the second and concluding part of this article, to be published later, the author will describe microscopic and other methods of examining canned fish and will discuss the interpretation of results. The list of references will also be given.**

# CANNING PILCHARDS IN CORNWALL

By Elliot B. Dewberry, M.B.E., F.R.S.H., F.R.I.P.H. & H.

**Canning has replaced casking in the Cornish pilchard industry, which is now more prosperous than at any time in its centuries-old history. Here is how Cornish Products (Looe), Ltd., handle between 20 to 25 per cent of all pilchards landed in the U.K.**

THE pilchard is a member of the herring family and the most oceanic of any of the race. The British species (*Sardina pilchardus, Walbaum*) abounds in the waters around the coasts of Devon and Cornwall and the south and south-west coasts of Ireland.

**Historical**

The pilchard fishing industry of Cornwall is of considerable antiquity, and as early as 1588 regulations were made to ensure a satisfactory distribution of the fish and also to prevent their exportation. This was necessary as the home markets were stimulated by the large number of National Feast Days on which it was forbidden to eat meat. Comparatively little preservation or curing took place at this period, however, owing to the scarcity of salt, which in later years was obtained from France. The flourishing conditions existing in the West Country during the seventeenth and eighteenth centuries were due to the monopoly of the pilchard fisheries, which were the mainstay and support of the coastal inhabitants, as the large catches of these fish, and their subsequent curing, afforded employment to men, women, and children.

The earliest method of preservation was termed "bulking." The pilchards were salted down in bulk for about a month and the brine and oil draining from the mass was carried off by channels into a storage cistern. The fish were afterwards washed, drained, and press-packed in casks.

Later, a change took place in the method of preservation owing to the introduction of "curing" tanks. It is a curious fact that about this period the pilchards deserted the bays for deeper waters, and the enormous shoals which formerly frequented the shallow waters of the Cornish coast were no longer seen. The last big "inshore" catches were made at St. Ives in 1907.

During the First World War fishing for pilchards ceased entirely. It commenced, however, on the cessation of hostilities, and the industry again represented an important section of the West Country fisheries, large catches being landed at the Cornish ports.

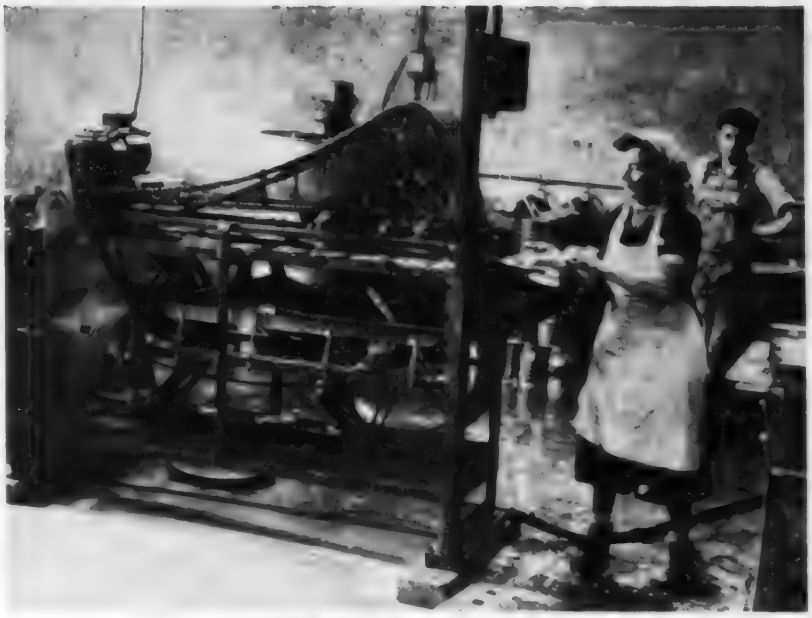
A stimulus was given to the fisheries in 1936 by the introduction at Mevagissey of a plant for the preparation and canning of pilchards. During the Second World War practically all the fish caught were marketed in a fresh condition.

In 1947-48, Cornish Products (Looe), Ltd., were handling pilchards in the form of tanked cured pressed and barrelled fish, for export to European and other countries. A small amount of canning, however, sometimes took place.

During 1949 this firm decided to concentrate entirely on the preparation and canning of pil-

chards. The factory was completely reorganised and up-to-date plant and machinery installed. This change enabled an attractive, nutritive, and appetising canned product to be produced and placed on the market at a reasonable price. The majority of the pack was for home consumption, but later consignments were exported to the West Indies, Africa, Fiji, Singapore, and Germany. Cornish Products (Looe), Ltd., now pack between a quarter and one-fifth of all pilchards landed in Great Britain.

It is of interest to note that in 1956 a carton (48 × 7 oz. oval) of canned pilchards was included in the food taken by the London School of Economics Mountaineering Club on their Himalayan expedition. These were carried up to the highest camps (18,500 ft.) and satisfactorily survived the extremes of temperature and the battering received during the difficult approach march. The fish also proved to be a very popular food.



**Can draining machine in action.**

**Food value**

The following figures give an approximate percentage composition of fresh pilchard flesh:

Moisture 60 to 70%
Fat 18%
Protein 18 to 19%

Towards the stage of sexual ripeness the water and protein decrease but the fat increases. After spawning the flesh becomes thin and watery.

The food value of canned pilchards depends on whether they are caught in the summer or winter months, as indicated in the following analyses:

| | *Moisture* | *Fat* | *Protein* |
|---|---|---|---|
| Summer | 55·30 | 13·60 | 25·60 |
| Winter | 58·20 | 9·70 | 16·00 |
| | *Nitrogen* | *Ash* | *Total* |
| Summer | 15·40 | 5·20 | 99·70 |
| Winter | 16·00 | 5·90 | 99·80 |

In addition to the large amounts of protein, the oil (fat) contains vitamins A and D. These make the pilchard a valuable article of diet, especially for children, the flesh being nourishing, rich in energy, and easily digested.

The landings and value of British taking of pilchards in England and Wales during the past three years are as follows:

| *Year* | *Cwt.* | *£* |
|---|---|---|
| 1953 | 109,138 | 122,402 |
| 1954 | 60,030 | 65,620 |
| 1955 | 96,993 | 124,828 |

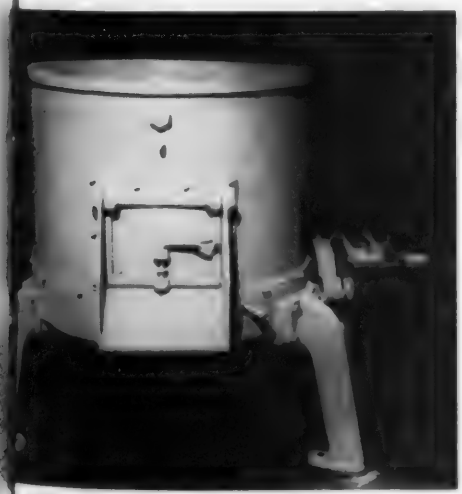
Export of pilchards of British taking:

Cured or salted—

| *Year* | *Cwt.* | *£* |
|---|---|---|
| 1953 | 12,807 | 54,090 |
| 1954 | 10,676 | 40,505 |
| 1955 | 2,385 | 11,449 |

Canned—

| | | |
|---|---|---|
| 1953 | 2,744 | — |
| 1954 | 2,874 | — |
| 1955 | 2,366 | — |



**Fish washing machine.**

**Fishing**

Fishing takes place in the south-western waters of the English Channel from the Wolf Rock around Mounts Bay to the Lizard and along the south coast of Cornwall as far as the Eddystone. The pilchards are caught in drift nets drawn by diesel-driven vessels equipped with "echometers" for locating the shoals of fish. The drifters, which may travel up to 20 miles out to sea, shoot their nets shortly after sunset or just before sunrise. These are examined every hour or two until a considerable quantity of fish have been enmeshed. A minimum catch of 100 stone (12½ cwt.) is considered sufficient to ensure the crew a living.

The fishing season lasts from June to February with the peak in November, when the fish are extremely plentiful, although sharp fluctuations occur, however, from year to year. No fishing takes place during the breeding season, but only when the generative organs are small and undeveloped and the fish are fat and in prime condition. After hauling in the nets the drifter makes port as soon as possible and the fish are landed within a few hours in a perfectly fresh state for canning.

*Left:* **The packing table in operation.** *Right:* **Stillage with retort basket in position for wheeling into retort.**

**Unloading**

The catch is unloaded at Looe harbour quay into cane baskets and weighed, transferred to wooden boxes or metal receptacles, and collected by motor vehicles for transporting to the cannery. On arrival the fish are inspected, and those selected taken to the feed tables of the *Arenco* nobbing machines. Operators, two to each machine, insert the fish into the slots or pews on the steel belts at the rate of from 65 to 80 per min. The operators wear gloves to avoid being pricked by fish bones.

The *Arenco* machine, which is constructed of stainless steel and electrically driven, removes the head of the pilchard by a clean cut, pulls out the stomach and gut, leaving the roe or milt in position. It is not split open and no bones are removed. Finally, a circular knife cuts off the tail. An arrangement of water jets clean the knives and gut extracting rollers, and also push the fish into position for tail cutting. About 120 stones is the average hourly output from each machine.

The eviscerated fish are discharged into stainless steel pans. The offal collected from the bottom of the apparatus is either used for manure or processed for animal food.

**Washing and descaling**

The pans of fish are then removed to the *Fisadco* electrically driven scaling and washing machine, in close proximity. About 4 to 6 stones of fish are placed in the machine, consisting of a cylinder in which is embodied a revolving table with four ribs. The fish come into contact with two plough-shaped baffles attached to the cylinder, causing them to rub against one another, which loosens their scales. Sprays of water cleanse the fish and at the same time wash away the scales through an aperture between the revolving table and the cylinder. The scaled pilchards are expelled by centrifugal motion through a spring-loaded door. The process gives them an attractive silvery appearance.

At this stage of preparation fish not required for immediate canning are placed in aluminium alloy containers and transferred to the chill-room (capacity of about 4,700 stones) and stored at a temperature of 33°F. until required. Those for canning are immersed in tanks containing a 40% brine for about 20 min. This brine solution is made up with a special undried vacuum salt, without calcium or sulphates and with a suitable percentage of moisture. The fish on removal from the brine are placed in baskets and immersed in clean water, gently washed, drained, and transported to the packing tables.

**Packing**

Women pack the pilchards into the different sized cans, viz. 6 oz. tall, 7 oz. oval, 14 oz. oval, and 15 oz. tall. They are arranged inside the cans tails to the centre and heads outwards alternately, with the silver belly upwards, and weighed to a pre-determined weight.

**Inverting and draining**

The packed cans are placed on a conveyor belt which carries them through a special steam-heated enclosure maintained at a temperature of 200°F. to which they are exposed for about 10 min. and allowed to cool for 20 min. before being fed by hand to the special draining machine. This inverts the open cans on to a stainless steel woven wire belt and allows the oil and liquid exuded from the fish to drain off. The machine deals with approximately 50 cans per min. They are finally discharged, right side up, direct on to the conveyor belt in connection with the automatic tomato sauce filler.

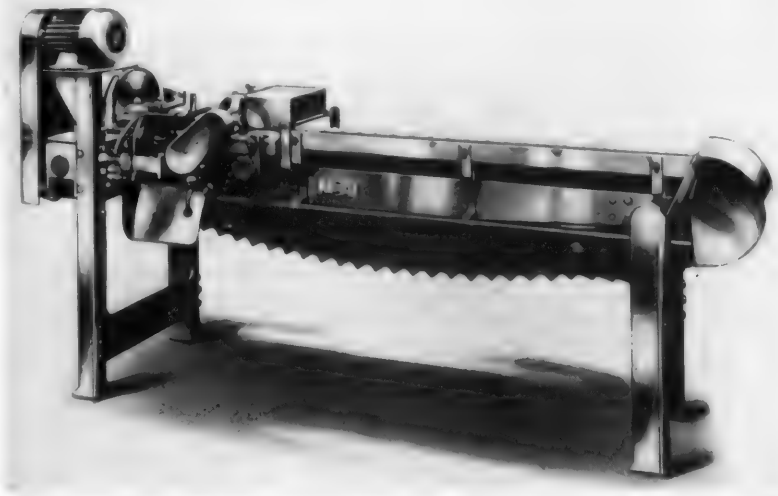
The processes of steaming and draining improve the quality of the pack by giving it mildness in flavour and firmness in texture.

The tomato sauce is made from the finest tomato purée together with a proportion of groundnut oil and salt. The oil takes up some of the colour from the purée and gives a sparkle to the sauce. The ingredients are placed in a stainless steel mixer which deals with about 80 gal. at one mixing, being sufficient for half a day's work when the canning season is at its peak. The cans in passing on the conveyor operate a trip lever on the reservoir holding the correct amount of sauce, which is then injected into each can, adjustments

being made for the amount of sauce for the different sized cans. The demand for pilchards in tomato sauce is much greater than for the fish canned in natural brine. The latter are supplied when specially ordered, in which case the cans are filled with 2½ to 3½% brine solution, dispensed from an automatic filler.

A final visual examination is made of the filled cans as they pass to the lid feeding and clinching machine. The covers are clinched on to the cans to protect the contents during the period they are in the conveyor exhaust box, viz. 13 min. at 190-195°F. The temperature of the contents is raised to a minimum of 180°F. before delivery to the high-speed seamer, which rolls on the lids. Seaming at 180°F. has been found sufficient for satisfactory storage in temperate climates, but for storage in the tropics 200°F. for 20 min. is preferable.

**Tomato purée filling machines fed directly from drainer.**



**The "Arenco" nobbing machine for de-heading and gutting pilchards.** (*See also p. 256.*)

The sealed cans pass from the seamer to the spray washer, which ensures they are clean before being sterilised. They are then placed in wire baskets for processing, each of these holds 1,800 6 oz., 1,300 7 oz., 750 14 oz. or 15½ oz. cans. There are 5 retorts each accommodating two baskets. The cans are processed at a temperature of 240°F. for 60 min. or more, depending to a certain extent on the hardness of the bones in the fish. It is the complete softening of these which has to be achieved, in addition to the destruction of spoilage organisms.

After processing the cans are pressure cooled in the retorts to about 130°F. The cooling water, however, shows a temperature of about 90°F. The cans, being warm, soon dry after the removal from the retorts.

**Labelling and packing**

Labelling (side bands only) is carried out by machine at the rate of 50 per min. in the case of the 6 oz. and 15½ oz. sizes. The covers of the 7 oz. and 14 oz. cans are lithoprinted. All covers are embossed with a coded date stamp.

The cans (unwrapped) are packed by hand in fibreboard cartons, 48 in each and left to mature for 30 days, after which they are labelled for release to wholesalers. The quality of the product is improved by a period of maturing and enables the tomato sauce to penetrate well into the flesh of the pilchard, which acquires a pinkish colour. Sample cans are taken from each batch as to quality and also for transmission to the laboratory for incubation and bacteriological examination.

The factory is able to cope with 2,000 stones of raw pilchards per day when packing the smaller sized cans. Machine speeds are slightly more than 50 cans per min., giving a production rate of over 30,000 cans per day with overtime working.

The Public Health Officer of the Local Authority makes periodical inspections of the cannery in accordance with the Provisions of Food and Drugs Act, 1955, and the Food Hygiene Regulations, 1955.

The sole distributors of the Company's products are Whiteley, Muir, and Zwanenberg, Ltd.

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▶ The development of fish preservation from the beginning of the century up to the present day is described in a recent issue of *Sabroe News* by Chief Engineer E. Holten.

# CANNING BREAD AND BAKERY PRODUCTS

**Bread is not commercially canned in Britain, but the subject has aroused considerable interest in the U.S.A., where it is seen as a convenient method of feeding the Armed Forces. This article,* gives recipes and describes the production of canned bread, pound cake, fruit cake and pecan roll.**

THE principal modification in manufacturing canned baked products is that these products are baked in tin cans rather than in the customary baking pans. Goods are prepared from high quality ingredients, utilising prescribed formulations and processing in conventional bakery machinery. The resulting dough or batter is then placed in tin cans with the can lid loosely clinched in place by a can-sealing machine. The loosely clinched lid permits escape of leavening gases and steam evolved during baking in the standard baking oven.

### Can sealing, cooling, flip-testing and packing

Following baking, all four military canned baked products are processed in an identical manner. Immediately upon removal from the oven, the tin cans are hermetically sealed by an automatic can-sealing machine. As the sealed can cools, the steam atmosphere within the can condenses, creating a natural high vacuum. A high internal vacuum (not less than 25 in.) is necessary to preserve flavour and prevent can corrosion during storage. To achieve this, can sealing must be accomplished within 60 sec. after removal of can from oven. This procedure, therefore, must be carefully co-ordinated.

After sealing the canned baked products are cooled. Unless this is accomplished rapidly, the colour and flavour of the product in the can is impaired. Rapid cooling may be accomplished in several ways, namely: (1) exposure (on racks) to fan-driven, rapidly moving air streams; (2) passage through a water spray tunnel; or (3) immersion in running cold water.

To make certain that the can is perfectly sealed and possesses a high internal vacuum, the cooled can is run through an additional automatic machine known as a "flip-tester," which determines the presence or absence of vacuum within the can in the following manner. One end of the can (usually the top end) is placed under a close-fitting, rubber-seated bell. A 27- or 28-in. vacuum is applied within the bell above the can end. When the vacuum within the bell exceeds the vacuum within the can by 5 or 6 in., the can lid bulges outward like the head of a drum. This outward bulging of the can lid activates a mechanism which rejects this can from the moving line. Cans possessing little or no vacuum are rejected as "mis-seals" or "leakers." The lids on cans having internal vacuums in excess of 20 in., of course, will not bulge outward and, therefore, will pass through the machine as acceptable. After "flip-testing," the clean dry cans are packed into containers for shipment.

## CANNED BREAD

### Ingredients and formula

Manufacture of the military canned white bread utilises a bleached and matured, enriched winter wheat flour, compressed yeast (or equivalent of active dry yeast), salt, and sugar (cane, beet, or corn). Less common bakery ingredients in the formulation are buttermilk solids and edible lactic acid (to increase acidity and improve keeping properties of the canned bread), inactive dry yeast (for added vitamin fortification), and a special rancidity-resistant shortening known as "100 hr. shortening." A large percentage of shortening is employed in the formulation to provide a high calorie content in the canned bread. Absorption in the dough is held at 50% or less to facilitate achieving a finished baked bread moisture content of 35% or less to assure adequate keeping properties. The formula is as follows:

| *Ingredients* | *Parts by weight* |
|---|---|
| Hard wheat flour, enriched | 100·00 |
| Water, not more than | 50·00 |
| Compressed yeast* | 2·00 |
| Salt | 1·75 |
| Sugar (cane, beet or corn) | 8·00 |
| Shortening | 12·00 |
| Buttermilk solids | 2·00 |
| Edible lactic acid (60%) | 0·30 |
| Inactive dry yeast | 1·50 |

* Or equivalent active dry yeast.

### Dough processing

Military canned bread is made by the 100% sponge process. All of the sifted flour, water, salt, and yeast are combined into a sponge using a moderate amount of mixing in the customary manner. Temperature of the sponge at completion of mixing is held between 78 to 82°F. The sponge is fermented for not less than three hr. in an air-conditioned fermentation room or in a "cabinet" fermentation box. Prior to combining with the sponge, the balance of the canned bread ingredients (sugar, shortening, buttermilk solids, and lactic acid) are mixed into a creamed mass to achieve even distribution of the buttermilk solids in the dough. The fermented sponge is then placed in the mixer, combined with the creamed mass,

* Based on extracts from the booklet "Invitation to the Baking Industry to Manufacture Canned Baked Products for the Armed Forces Combat Rations," published by the U.S. Quartermaster Food and Container Institute for the Armed Forces.

and mixed at high speed until the gluten is fully developed. Temperature of the resulting dough is controlled by use of ice water or brine in the cooling jacket of the mixer so that the dough when dumped from the mixer does not exceed 86°F.

**Dividing and canning**

Without floor time, the canned bread dough is then divided into dough pieces of the proper weight. The standard commercial dough divider capable of sealing uniform 10-oz. dough pieces is satisfactory for the 401 × 411 can size. For the smaller can sizes, an automatic bun divider is required. Alternatively, two five-oz. pieces, scaled on the bun divider, may be used for the 401 × 411 can size. Can size, scaling weight, and yield of baked bread are summarised in the following table:

| *Can size* | *Scaling weight* | *Minimum baked contents* |
|---|---|---|
| | (oz.) | (oz.) |
| 401 × 411 | 10·0 | 9·50 |
| 300 × 407 | 5·0 | 4·50 |
| 300 × 308 | 4·0 | 3·75 |
| 300 × 200 | 2·0 | 1·75 |

After dividing, the dough pieces may be rounded in the standard rounder; however, this operation is not required. Prior to placing in the tin can, the dough pieces are covered by a film of shortening (instead of greasing the cans). This may be accomplished by rotating the dough pieces over a short moving belt, coated with melted shortening, under a wide, flexible drag chain. The dough pieces then are deposited by hand into clean, dry, empty tin cans and the lids are attached in a clinching machine. In this operation, the lids are loosely attached by a single or "first roll" operation. By code markings imprinted on the can lid, the batch number and date of baking are marked on each can.

**Proofing and baking**

The cans of bread then are proofed. In order to determine the proper proof, the lids of several control cans for each dough batch are not clinched but merely placed on the cans so that they may be removed for observation. When the proofed dough occupies approximately 50 to 60% of the total can volume, the cans are loaded into the oven for baking. Proofing must be carefully controlled since under-proofing will yield a loaf of bread which does not fill the can completely and over-proofing results in a compression streak in the baked loaf. When properly proofed, the canned bread is loaded into the oven for baking. The cans are evenly spaced in the oven (minimum distance between cans approximately 1½ in). The canned bread is baked at 425°F. for 15 to 35 min., depending upon can size.

## CANNED POUND CAKE

**Ingredients and formula**

Ingredients are all common to cake manufacture, and include a bleached soft wheat flour, granulated sugar, shortening (rancidity resistant 100-hr. type), whole eggs, egg yolks, salt, and vanilla flavouring. The formula is as follows:

| *Ingredients* | *Parts by weight* |
|---|---|
| Soft wheat flour | 25·00 |
| Shortening | 25·00 |
| Whole eggs | 12·50 |
| Egg yolks | 12·50 |
| Granulated sugar | 25·00 |
| Salt | (as required) |
| Vanilla flavouring | (as required) |

**Batter processing**

The pound-cake batter is prepared in the normal manner by creaming the shortening with the sugar or flour and then gradually adding the balance of the other ingredients until a smooth homogeneous mixture is obtained.

**Depositing, clinching and baking**

Prior to filling with batter, the cans are lined with vegetable parchment paper utilising a die-cut paper disc for the can bottom and a die-cut strip for the can walls. For the 300 × 200 can, a fluted paper cup made from vegetable parchment paper may be used. Cake batter is then deposited into the cans utilising a can filler or a cake depositor modified to automatically feed tin cans. Can size, scaling weight, and yield of baked cake is summarised in the following table:

| *Can size* | *Scaling weight* | *Minimum baked contents* |
|---|---|---|
| | (oz.) | (oz.) |
| 401 × 411 | 12·5 | 11·50 |
| 307 × 409 | 8·5 | 7·75 |
| 300 × 308 | 5·0 | 4·50 |
| 300 × 200 | 2·5 | 2·20 |

After filling, the lids are loosely attached to the cans in a clinching machine by a single or "first roll" operation. By code markings imprinted on the can lid, the batch number and date of baking are marked on each can. The cans then are loaded into the oven for baking at 350°F. for 15 to 40 min., depending upon can size. The cans are evenly spaced in the oven (minimum distance between cans approximately 1½ in.).

## CANNED FRUIT CAKE

**Ingredients and formula**

Ingredients employed are all common to fruit cake manufacture and include bleached hard wheat flour, shortening (rancidity resistant 100 hr. type), whole eggs, granulated sugar, salt, vanilla flavouring, water, bleached seedless raisins, unbleached seedless raisins, diced glacé cherries, diced glacé pineapple, diced glacé citron, diced glacé orange and lemon peel, and pecan pieces.

*Cake Batter*

| *Ingredients* | *Parts by weight* |
|---|---|
| Bleached hard wheat flour | 24·00 |
| Shortening | 18·00 |
| Whole eggs | 20·00 |
| Granulated sugar | 27·00 |
| Salt | 0·75 |
| Vanilla flavouring (approx.) | 0·25 |
| Water (approx.) | 10·00 |
| Total | 100·00 |

*Fruit Blend*

| *Ingredients* | *Parts by weight* |
|---|---|
| Raisins, seedless, unbleached | 12·50 |
| Raisins, seedless, bleached | 12·50 |
| Cherries, diced | 25·00 |
| Pineapple, diced | 15·00 |
| Citron, diced | 7·00 |
| Orange peel, diced | 6·00 |
| Lemon peel, diced | 2·00 |
| Pecan pieces | 20·00 |
| Total | 100·00 |

**Fruit-cake batter preparation**

The batter for the fruit cake is prepared by creaming the shortening with the sugar or flour and then gradually adding the balance of the other ingredients during mixing until a smooth homogeneous mixture is obtained.

Before blending with the cake batter, the blanched raisins and drained glacé fruits are blended thoroughly with the balance of the fruit and nut blend. Thirty-five parts of cake batter and 65 parts of the fruit and nut blend are then mixed thoroughly to yield the finished fruit-cake mix.

Prior to filling with fruit-cake mix, the cans are lined with vegetable parchment paper utilising a die-cut paper disc for the can bottom and a die-cut strip for the can walls. For the 300 × 200 can, a fluted paper cup made from vegetable parchment paper may be used. The fruit-cake mix is then deposited into the cans utilising a can filler or a cake depositor modified to feed tin cans automatically. Can size, scaling weights, and yield of baked cake are summarised in the following table:

| *Can size* | *Scaling weight* | *Minimum baked contents* |
|---|---|---|
| | (oz.) | (oz.) |
| 401 × 411 | 24·50 | 24·0 |
| 300 × 407 | 12·50 | 12·0 |
| 300 × 308 | 9·50 | 9·0 |
| 300 × 200 | 5·25 | 5·0 |

After filling, the lids are attached loosely to the cans in a clinching machine by a single or "first-roll" operation. By code markings imprinted on the can lid, the batch number and date of baking are marked on each can. The cans are then loaded into the oven for baking at 300 to 325°F. for 30 min. to 2 hr., depending upon can size. During baking, the canned fruit cake should be spaced evenly in the oven (minimum distance between cans approximately 1½ in.).

## PECAN ROLL

**Ingredients and formulas**

Ingredients employed in the manufacture of canned pecan roll are all common to yeast leavened pastry baking and include bleached and matured hard wheat flour, non-fat milk solids, shortening (rancidity resistant 100 hr. type), water, compressed yeast (or active dry yeast), granulated sugar, egg yolks, salt, honey, ground cinnamon, pure vanilla extract, and midget pecan pieces. The pecan roll is composed of two distinct portions, *i.e.* (1) the dough, and (2) the filling. The formulas for each are listed as follows:

*Dough Formula*

| *Ingredients* | *Parts by weight* |
|---|---|
| Hard wheat flour | 46·00 |
| Nonfat milk solids | 2·00 |
| Shortening | 16·00 |
| Water | 15·50 |
| Compressed yeast* | 2·00 |
| Granulated sugar | 10·00 |
| Egg yolks | 8·00 |
| Salt | 0·50 |
| Total | 100·00 |

*Filling Formula*

| *Ingredients* | *Parts by weight* |
|---|---|
| Granulated sugar | 23·00 |
| Honey | 24·00 |
| Shortening | 13·00 |
| Ground cinnamon | 2·00 |
| Salt | 1·00 |
| Pure vanilla extract† | 0·50 |
| Hard wheat flour | 24·50 |
| Midget pecan pieces | 12·00 |
| Total | 100·00 |

* Or equivalent quantity of active dry yeast.
† Single strength.

**Processing and "make-up"**

The pecan roll dough is prepared by a straight dough method. The temperature of the dough is controlled so that it does not exceed 82°F. The dough is given only sufficient fermentation time to relax the flour gluten and achieve optimum machinability.

The pecan roll filling is prepared by blending all ingredients on slow speed in a mixer until a uniform creamed mass is obtained.

The pecan roll dough is continuously sheeted on a mechanical bench so that the dough sheet is not less than 10 in. wide, and a 9 sq. in. piece shall weigh not more than 1 oz. The filling then is continuously sheeted on to the pecan roll dough and is synchronised so as to yield equal weights of dough and filling over any given surface area. The resulting sheeted dough and filling is then rolled mechanically and continuously in a spiral (as in a cinnamon bun) so that the roll has six distinct layers of dough and five layers of filling when cut at a right angle to the length of the roll. Cutting to the proper size and weight is accomplished by a "guillotine" cutter.

**Depositing, clinching, and baking**

Prior to filling, the tin cans are lined with silicone-treated vegetable parchment paper utilising a die-cut disc for the can bottom and a die-cut strip for the can walls. The raw pecan roll is then placed in the tin can. Can size, scaling weight, and yield of baked pecan roll are summarised in the following table:

| *Can size* | *Scaling weight* | *Minimum baked contents* |
|---|---|---|
| | (oz.) | (oz.) |
| 401 × 411 | 20·50 | 19·50 |
| 300 × 407 | 10·50 | 10·00 |
| 300 × 308 | 8·25 | 8·00 |
| 300 × 200 | 4·50 | 4·25 |

After filling, the lids are attached loosely to the cans in a clinching machine by a single or "first roll" operation. By code marking imprinted on the can lid, the batch number and date of baking is marked on each can. The cans are then loaded into the oven for baking at 400°F. for 20 to 60 min., depending upon can size. During baking, the canned pecan roll should be spaced evenly in the oven (minimum distance between cans approximately 1½ in.).

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The 1957 edition of the *Yearbook* of the Dutch Pastry, Rusk-Biscuit-, Cake and Wafer Industry has now been published. The addresses, telephone numbers of goods made by nearly 250 Netherlands manufacturers of biscuits, wafers and similar specialities are listed. Further information upon these firms and free copies of the *Yearbook* are available from its editor at Marnixstraat 380, Amsterdam.

# SAFETY DEVICES FOR DOUBLE SEAMING LARGE CANS

By J. B. S. Braverman and Youssef Boulos*

WHEN closing large size tins with semi-automatic double seamers, it is rather difficult and sometimes even impossible to use the automatic end feeder for the covers. However, the speed at which such cans are usually closed is slow enough to permit putting the covers on by hand. The usual procedure in such cases is, therefore, the shifting of the full can with the loose cover on it to the lifting table, placing it in the half moon in readiness for the seaming operation.

While doing this the cover is occasionally dislocated and the operator usually adjusts its position on the can by hand. At this point the operator may absent-mindedly press the pedal which raises the lifting table thus putting the seaming rollers into operation. It is obvious that this presents a potential danger to the operator, whose fingers may be caught by the rollers.

In Israel the double seamers are used in packing orange concentrate or tomato products in A 10 tins, and unfortunately some of our operators have lost the first joint of their forefinger. It is true that the double seamers are provided with a safety disc which should be attached below the seaming chuck carrying the rollers. However, more often than not this ring is omitted, the reason being that it greatly inconveniences the ready approach to the seaming chuck and the rollers in case of default.

It is the purpose of this paper to describe two safety devices which could be permanently attached to such double seamers and thus prevent any accidents arising from the operations described above.

The first of these devices is based on a very well-known principle, namely that a given movement and its direct counteraction

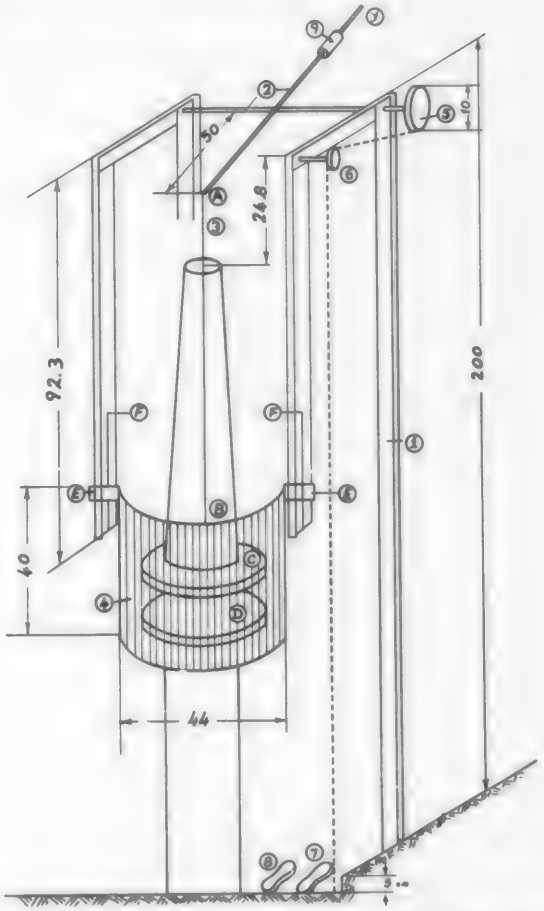



**Fig. 1. Sketch of the arrangement for the double seamer, drawn in perspective.**

1. **Steel frame.**
2. **Cross shaft with sliding weight (9) on one side and a fixed pulley (5) on the other.**
3. **Steel rope which connects cross shaft at point (A) with the sliding screen at point (B).**
4. **Semi-circular screen which can slide between points (F) and (E).**
7. **Suggested pedal operating the screen.**
8. **Original pedal operating the lifting table.**

**C. Rotor Compartment.**

**D. Lifting Table.**

are assigned to one and the same hand or foot: you cannot operate one unless you stop operating the second. A vivid example of it are the brakes and the accelerator pedal of a motor-car—both are operated with the right foot and you cannot apply the brakes unless you take off your foot from the accelerator and stop the delivery of petrol, and *vice versa*.

On the above principle we arranged alongside the pedal, which controls the lifting table in the double seamer (which we shall call for short the "table pedal"), a second pedal which when stepped upon could move a screen in front of the operator (the "screen pedal"). This screen is built around that part of the seaming machine which is dangerous in the

* Division of Food Technology, Technion—Israel Institute of Technology, Haifa, Israel.

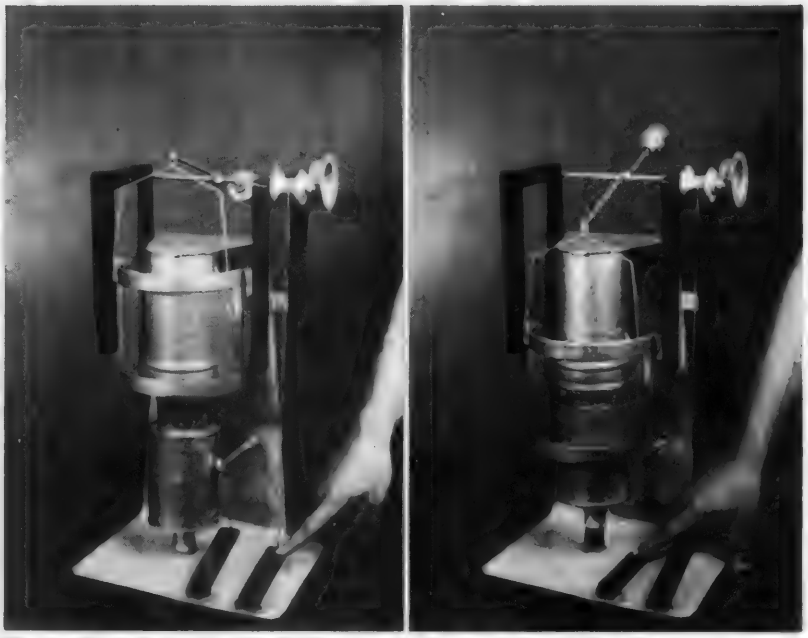


**Fig. 2. Model showing (*Left*) the screen raised and the tin free for any necessary adjustments, (*Right*) with screen in position and the table lifted and ready for the seaming operation.**

sense described above and it slides easily up and down. When the screen pedal is pressed it raises the screen high enough to permit the operator to adjust the covers on the cans. When the operator is ready to press the table pedal and thus to start the seaming operation he is obliged to remove his foot from the second pedal thus releasing the screen which will then come down with a bang and compel the man to remove his fingers from the danger spot.

Fig. 1 shows a sketch of the arrangement, and

Fig. 2 is a photograph of a model showing the two positions: (*a*) with the screen raised and the machine free for any necessary adjustments, and (*b*) with the screen in position and the table lifted and ready for the seaming operation.

Both the drawing and the photograph are self-explanatory, and the safety device can be made to scale for any seamer of this kind. The only problem to solve is the obvious necessity to raise the screen some 40 cm. (16 in.), while the pedal should travel a distance of only about 5 cm. (2 in.). This was easily solved by transmitting the movement tangentially to a wheel of a larger diameter and from it to its axes 8 times smaller in diameter.

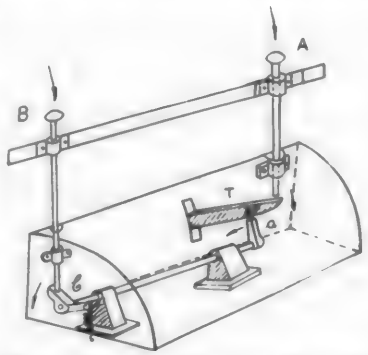



**Fig. 3. Arrangement necessary to operate the table-pedal (T). The push button (A) can press down the table-pedal only if push button (B) causes the removal of the obstacle (a) by turning the axis (b).**

The operator will now take the following steps:

(1) Press the screen pedal and keep his foot on it while making the next two steps.

(2) The screen is up, the operator is free to shift the full can into position in the half moon of the lifting table.

(3) Adjust the cover in position.

(4) Now he is ready for the closing operation, shifts his right foot from the screen pedal and presses the table pedal.

While through this first device we compel the operator to remove his hands from the danger spot, the second device,* which we are about to describe, is based on another principle. Here both hands which are in potential danger must be removed from the danger spot in order to carry out the seaming operation. In this safety gadget the table pedal can work only if the two hands of the operator press simultaneously on two handles placed just in front of him on both sides of the seamer. Pressing only one such handle will not release the table pedal. Fig. 3 shows a sketch of the proposed gadget.

It is considered that this second device slows down the operation, although from the point of view of safety it is probably preferable.

* This arrangement has been suggested and executed by Mr. Klein of Jaf-ORA, Ltd., Rehovoth, Israel.

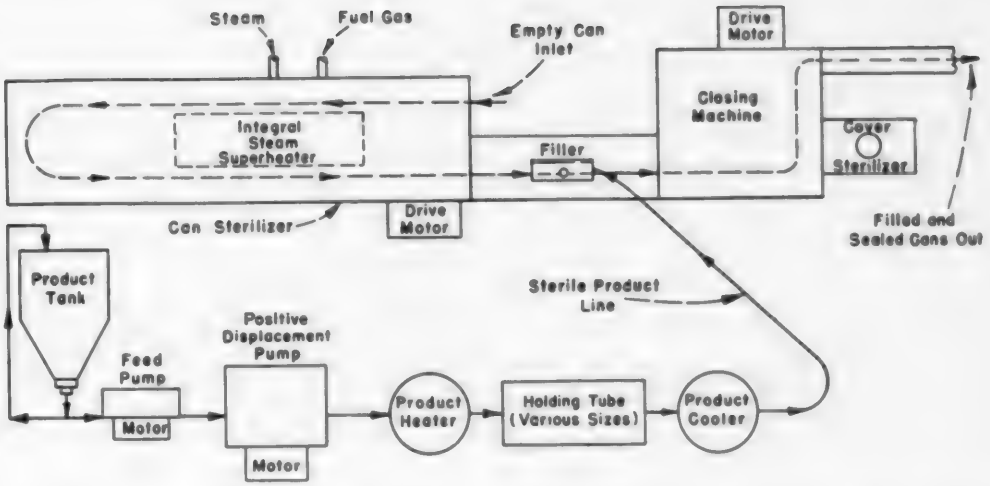
## Safety of Can Coatings

PLANS were made by M. Ives and G. M. Dack (*Food Res.*, 1957, **22**, 1, 102), to conduct animal feeding studies with monkeys and rats on foods packed in cans with five representative inside enamel coatings used in the largest volume for different classes of foods.

No differences in blood picture, weight gains, nor findings in gross and microscopic examination of the tissues were found in the 30 monkeys fed for 12 months from enamelled cans when compared with the animals fed from the stock ration, even though they were fed at 100 times the level at which such enamel extractives could be expected to occur in the average American dietary.

The 24-month rat studies lasted the average life span of the animal without effects traceable to the diet. Again there were no differences in food consumption, weight gain or blood pictures among the 11 groups of rats and examinations of the tissues were negative.

The evidence obtained in this study indicates that enamel coatings for food cans as manufactured at present are non-toxic.




# CANNERY INSTRUMENTATION

By Leo Walter, A.M.I.Mech.E.

**Developments in instrumentation march in step with progress in plant design. Here is a review of some instruments for controlling process variables in canneries.**

PARALLEL with the introduction of better canning methods and the development of continuous machinery, has been the improvement of plant instruments. A continuous processing method requires highly sensitive, *i.e.* fast reacting, measuring, and controlling instruments. In a batch canning process the rate of processing is usually slower than in a continuous process. This allows more time for a plant instrument to measure or to control. The worst that can happen if an automatic control instrument fails completely is that a batch is spoiled. It is different with automatic control of, say, a continuous pea blancher. If thermostatic control action starts lagging or becomes erratic a great deal of damage may be done. Reliability is the second essential for modern plant instruments in the cannery.

Looking at certain canning operations as a heat flow process, the canning of meat and fish has, generally speaking, much in common with that of fruit and vegetables, and either pneumatic or electric control methods are used to ensure uniformity.

**Fig. 1. New Cambridge electronic recorder for continuous measurement.**

*Above:* **The diagram shows the flow of the fully automatic Martin aseptic canning method.**

The main controlled processing factors are rate of heat input, maximum temperature of the treated product, and sometimes other process variables, such as pressure of autoclaves, liquid level of a processing vessel, or *p*H of the processed goods.

Automatic retort cooking is widely used today. Modern pneumatic and electronic methods incorporating timing devices, audible and/or visual alarm signals and time - temperature mechanisms make retort cooking a push-button process. The controls are set as desired, the cooking cycle is set in motion by pressing a button, and the process starts and ends automatically. Automatic control of machines for filling, seaming, and transport of cans is widely used. Electronic photocells prevent conveyors from jamming, direct cans, and count moving cans, etc. Electronic developments are used for the automatic sorting of beans. Thermostatically controlled hot water blanchers ensure continuous blanching of fruits or vegetables at exact predetermined temperatures.

The most remarkable progress made in instrumentation seems to be centralised supervision and/or control by grouping all related instruments on a central instrument panel. Meat sterilising retorts may have time-temperature recorder-controllers which allow a predetermined temperature curve to be used for each batch. A number of alarm signals (visible and audible) warn the plant operator immediately anything goes wrong. At the end of the process the plants stops automatically.

High-temperature methods, such

as "High temperature short time" processing, require more exact temperature measuring methods. Modern thermocouples in conjunction with high-speed electronic temperature recorders provide the means to keep near the critical temperature, but always within a stipulated safety margin.

Thermostatic control of bottle, jar, and can washing machines has greatly improved with the introduction of modern high capacity machines. Instead of using self-actuated thermostats the installation of very accurate, rapid-acting pneumatic or electronic regulator types is now favoured for larger plants. Programme control for certain cooker and cooler types has made great progress. The control mechanism includes a cam which produces variation of the temperature set point of the temperature controller to a desired time-temperature schedule. By simply exchanging the cam, any required time-temperature cycle may be easily obtained in thermostatic control. The latest development is a programme controller using transistors in place of electronic tubes.

In automatic liquid level control so-called floatless controls are widely used to keep the level in a process at a desired value.

Progress in *p*H-measurement and automatic control has been remarkable. Today's *p*H instruments are reliable and accurate means for supervising and controlling batch or continuous processes. The modern *p*H recorder produces continuous chart records. The sterilisation of canned fruit, tomatoes, vegetables, and meat is largely influenced by *p*H, which also affects the flavour of the foods.

**Centralised plant supervision**

Many measurements are related to each other, such as several temperatures, or temperatures and pressures. Instead of having separate instruments, the modern multi-point recorder assembles all chart records from several points of measurement on a single chart. The value of having chart records instead of an indicated value on one or several dial instruments cannot be disputed.

Telemetering, *i.e.* the remote transmission of measured or controlled values by pneumatic or electric means has also found wider use in the cannery. To see a number of measured or controlled process factors from widely dispersed points at a glance on a centralised instrument panel greatly helps production.

Temperatures at several different points can be periodically checked from a central point by "scanning." A multi-point indicator with selector switch is connected to electrical resistance thermometer bulbs at various points in the plant so that individual readings can be selected at the turn of a switch.

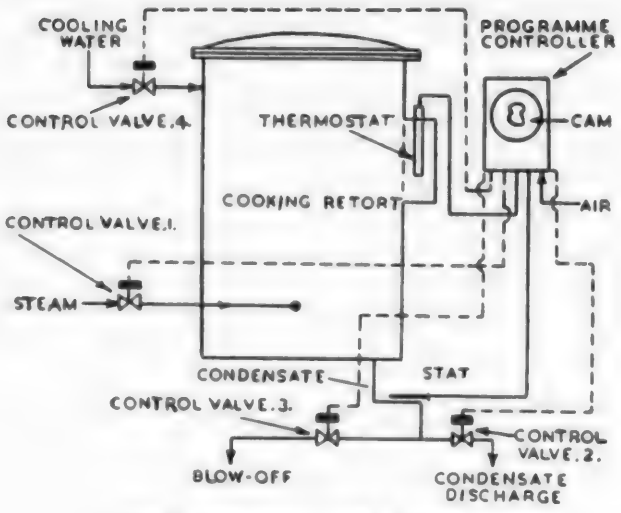



**Fig. 2. Programme control of retort.**

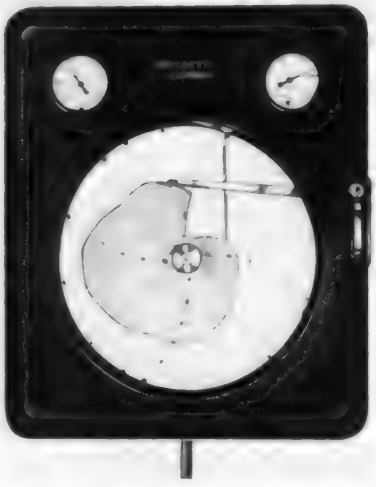


**Fig. 3. Air-operated recording programme controller for pre-determined variation of controlled factor.**

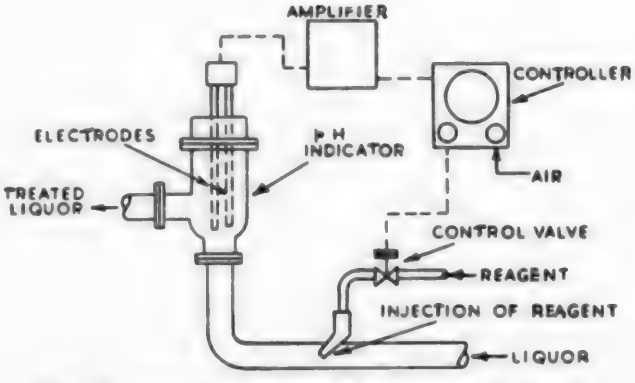



**Fig. 4. Automatic pH control by admixture of reagent.**

When modernising instrumentation in a cannery the following development should be taken into consideration. At important points of measurement replace simple indicating gauges by recorders, easily seen by the plant operator. Many retorts today use either circular or roll chart recorders, or recorder-controllers which not only show the operator and production manager the measured value at the present time, but also record the past values. In some instances it may be advisable to replace an old indicating dial gauge by a new design suitable for telemetering. The plant operator will still rely on the dial gauge to which he is accustomed, but by means of remote transmission a recorder located on a central supervisory instrument panel will produce the records on a chart. The causes of spoiled batches may thus be traced. Tele-recording is, of course, beneficial for the supervision of any continuous process from a central point.

Older types of plant and equipment, such as autoclaves, exhauster boxes, washing machines, driers, etc., do not always lend themselves to accurate automatic control. Before fitting any of these old designs with new instruments, it should be ascertained whether the equipment responds well to careful hand control. Should this be the case, the correct selection and installation of a suitable automatic controller will be beneficial.

New canning equipment is usually designed for automatic control. When ordering new equipment it is wise to specify efficient automatic controls right from the start. Their performance can be checked during preliminary test runs, and anything which falls short of expectations can thus be rejected and replaced.

Summing up, it can be safely stated that plant instrumentation in the modern cannery has kept pace with design developments. An instrument survey in a cannery is well worth while. The installation of modern instruments may mean more uniform production of canned goods and eliminate bad batches. In many cases increased output may be expected. Last but not least, plant operators may feel relieved from responsibility if the hand control of machinery is replaced by automatic methods. Experience has shown time and again that improved plant instrumentation pays.

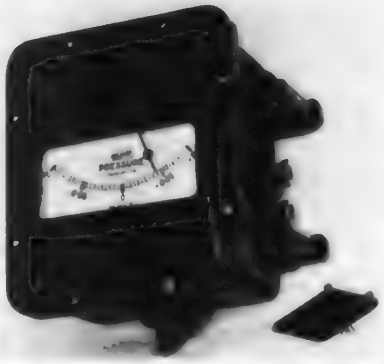


**Fig. 5. Elliott pressure transmitter for remote indication.**

## A Tale of Tea

Probably not many people realise that when they take their morning cup of tea or coffee, they are taking a mild form of drug, according to Mr. James Laver. It is to the presence of this drug, almost identical in both beverages, that Mr. Laver attributes the triumph of tea and coffee over other herbal infusions. In an entertaining foreword to a book* commemorating Twinings' 250th anniversary (see FOOD MANUFACTURE, Nov., 1956, p. 455), he describes the origins, both authentic and mythological, of tea and coffee drinking and their possible effects on national characteristics.

The book, written by the managing director of Twinings, is very attractively printed and engraved and is devoted to the history of the family and firm of Twinings, from the time when its founder, Thomas Twining, took over Tom's Coffee House in Devereux Court in 1706, to the present day.

* *The House of Twinings.* By Stephen H. Twining. 1956. R. Twining and Co., Ltd. Pp. xi+116, illustr. 21s. net.

## Advances in Meat Canning

(*Concluded from page 264*)

possible for the author to prepare even this rather incomplete review.

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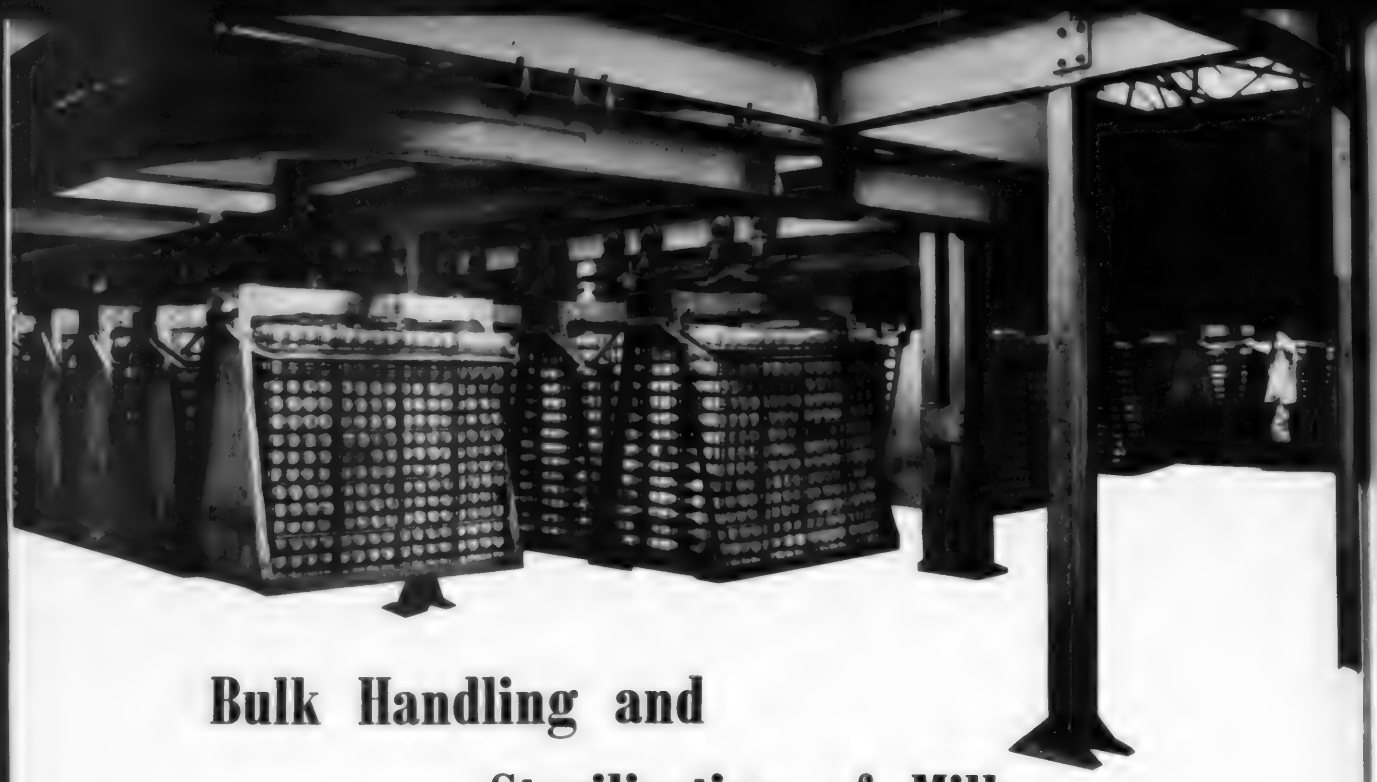


# Bulk Handling and Sterilisation of Milk

## *The Midland Counties Dairy Plant at Birmingham*

**By Norman Brampton**

AS Birmingham, with its population of 1,100,000, is the second largest city in Britain, it is natural that it should be served by one of Britain's largest milk sterilising plants. This is in the Cato Street premises of the Midland Counties Dairy, Ltd., whose head office is in Corporation Street, Birmingham.

The milk arrives at the Cato Street Dairy in road tankers, which are of two types, single compartment tanks with a capacity of 1,200 to 1,500 gal., and two compartment tanks with a capacity of 3,000 gal. About 25,000 gal. arrives daily.

The tanks are of stainless steel. I looked into one which was being cleaned, and was impressed by its mirror-like polish and smoothness.

On arrival the milk in the tankers is agitated with a plunger to ensure a proper distribution of the fat. Samples from the top and bottom are checked in the laboratory for quality, purity, and general condition, before the load is accepted.

When the milk has been passed by the laboratory, the liquid is pumped from the road tanks into holding tanks by stainless steel centrifugal pumps.

The eight holding tanks which the firm use are of three types, and the milk is put into the appropriate tank according to the estimated time which will elapse before it is moved along for processing. All these tanks are fitted with stainless steel agitators. These keep the milk gently moving, and prevent the fat from settling.

Three of these tanks, all of which are of stainless steel, are plain and unlagged. Two are insulated with cork lagging, but the most interesting group are three Heil tanks, which are lagged with 3-in. slabs of cork, and fitted with a direct expansion ammonia refrigerating system, to keep the milk cool.

*Above:* **The "Monorail" system is the dominating mechanical handling feature at the dairy. Stillages are suspended from the overhead system in the cooling bay.**

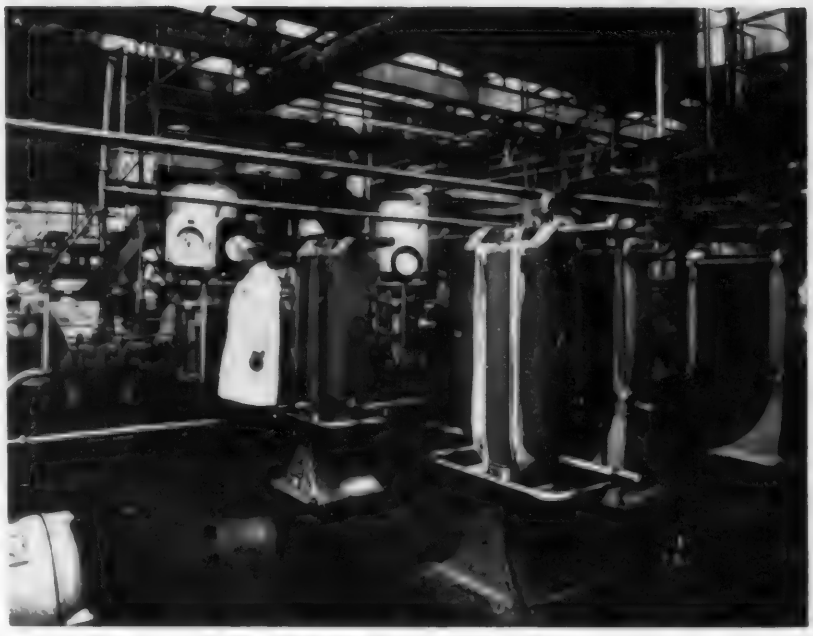
### Preheating

When the milk is withdrawn from the holding tanks it is preheated and filtered. It is drawn from the tank by a stainless steel centrifugal pump, and passed through a plate heat exchanger. This is thermostatically controlled to regulate the air supply to the air-operated diaphragm steam valve. This keeps the hot water in the exchanger at the temperature required.

The preheating mechanism is divided into two parts. First the milk is heated up to 100°F. Then it leaves this heater and passes through a filter. After filtering, it goes back to the second part of the

heat exchanger for further heating up to 158°F.

The milk is now ready to pass through stainless steel pipes into the nearby homogenising plant.



**The processing bay showing filters, heaters and homogenising plant.**

**Homogenisation**

The purpose of homogenising, of course, is to break up the fat globules into fine units, and ensure that they stay in a fairly even suspension throughout the milk. In this way the whole milk has an even creaminess and the cream does not settle out into a solid mass at the head of the bottle. The milk is taken from the hopper, which serves as a holding vessel or reservoir, and pumped through the homogeniser. The three-throw reciprocating hydraulic pumps, fitted with rams, valves, and head of stainless steel, are driven by a 60 h.p. motor through a *Radicon* gear-reducing unit. Milk is forced through the homogenising valves at a pressure of 2,000 p.s.i.

The valve itself is simple in construction, consisting of a 1-inch thick disc of stainless steel, with a hole of less than a quarter of an inch diameter through its centre.

The milk is forced through this hole, and must encounter a serrated spring-loaded valve, which forces the milk to spread out under heavy pressure. As a result the butter-fat is broken up into minute globules of a regular size, and these globules are evenly distributed throughout the milk and do not rise to the top.

The dairy has five homogenising units, each with a capacity of 1,250 gal. per hr., but it is rare that more than three of them are in use at the same time.

It is interesting to note that the effect of the pressure in the enclosed space of the homogenising unit raises the temperature of the milk by 5°F. The milk then passes through stainless steel pipes to the automatic vacuum filling section. The individual bottling machines are each equipped with a small holding reservoir, the filling of which is controlled by a stainless steel funnel-shaped float.

**Moving a suspended stillage, containing 90 gal. of milk, by electric truck.**

**Bottle washing**

Meanwhile the bottles are being prepared to meet the milk on the filling machines. This dairy has three bottle washers in use, each occupying a space about 7 ft. by 30 ft., and each machine having a 20-bottle width intake. They work on the soaker-hydro-washer principle, and are fully automatic.

The bottles are placed by hand on to the loading device on the washer. They are then tipped into the automatic washing carriers, and the carriers are moved forward by chain drives through a series of tanks and over a battery of jet sprays.

The cleansing process takes about 18 min. per bottle, and one washer normally serves two filling units.

In the first tank the bottles are given a pre-rinse, which takes out the heeltaps of milk and dislodges dirt. This tank contains 750 gal. of alkaline water at 90°F.

In the second tank the bottles pass through 750 gal. of more strongly alkaline water at 120°F. The third tank is of the same capacity, but it contains a *Calgon* solution, which is maintained at a temperature of 150°F.

All the tanks are steam-coil heated, and the temperature is automatically regulated. In the caustic soda tanks there is a small quantity of sodium aluminate which controls the etching effect of the caustic soda.

After the bottles have been through the three tanks, they pass over a battery of 14 sprays for the internal jetting of the bottles. The first set of eight sprays injects a *Calgon* solution. The second set of four sprays is composed of water at 160°F., and in the final set of two sprays there is pure corporation mains water (beautifully soft water from the Elan Valley in Wales) for the final rinse at 170°F.

This water is heated by a steam calorifier, with a coiled copper tube element. And it ensures that the gleaming crystal clean bottles are warm as they go forward on the conveyor to the filling machine to meet the hot milk. Otherwise, of course, there would be breakages.

The bottles are watched as they come off the washing machine by a bottle inspector, who picks off damaged bottles and "foreigners." On an average 400 dozen bottles of the right size and shape, but the property of other firms, are brought in every day and have to be sent to the bottle exchange depot, which the leading dairymen maintain on a co-operative basis in Birmingham.

**Bottle filling**

The bottles pass off the conveyor on to the table of the filling machine, which works by a rotary movement like a roundabout in miniature, and each machine is capable of handling 100 bottles per min.

**Bulk tankers unloading at the milk reception point.**

The bottles are lifted by air pressure to meet the filling heads, of which there are 24 on each machine. As each bottle is lifted into place, it is sealed by a rubber nipple; a valve tube is thrust into the centre of the bottle to exhaust the air, and the bottle is filled with milk fed from stainless steel tubes rising at an angle of 45° into the filling heads.

The height of the milk in the bottle is adjusted automatically, according to the level of the filling valve, and samples are taken and tested at intervals to ensure the accuracy and uniformity of this level.

As soon as the bottles are filled with milk, they are sealed by the same unit. Crown seals, lined with compressed cork are used. They have been found by experiment to be less porous and brittle than natural cork.

After sealing, the bottles are placed by hand in wire fabricated cases, which hold twelve bottles.

These containers are fitted with an ingenious device in the form of a small wire loop which hangs free when the case is set down sideways, and grips on to the shoulder of the bottle. This grip prevents the bottles from falling when the cases are stacked on their sides, which is the customary position for sterilising.

The cases of bottles are then stacked in stillages holding 60 doz. or 90 gal., ready for the very important process of sterilisation in a large autoclave.

**Sterilisation**

The Midland Counties Dairy have eight of these giant cylindrical autoclaves in use, which are some of the largest in the country. They are 8 ft. × 18 ft., and each can hold six stillages.

A small automatic truck helps to fill the autoclaves, *via* the *Monorail*, which has a draw-bridge bar, enabling the suspended stillages to run right into the autoclave. The bridge lifts out of the way when the huge shield-like steel doors are closed and automatically locked by the *Sure-Lock* device, which operates in one movement by a cam ring and ensures a tight closure.

When the autoclaves have been filled, the elapsed time recording controllers are started by moving two small levers. This automatic device opens a steam valve and

also keeps the air exhaust valve open for 15 min. The steam valve is capable of putting in steam at a rate of 2,200 lb. per hr., and so practically all the air is exhausted (usually there is a maximum of 1% of air left). At the end of 15 min. the air exhaust valve closes automatically, but the steam continues to enter until the internal temperature is 235°F. When the temperature reaches this point the recording control holds the temperature at this level for 15 min. by adding more steam, if necessary, as the temperature falls.

After 15 min. of heating the control process is reversed by the recorder operating the appropriate levers, and the steam is exhausted from the autoclave chamber in two or three minutes. The whole operation is recorded on a circle of graph paper, and can be inspected at any stage.

Next the bottles of sterilised milk are water sprayed, making use of the condensed water from the steam, which has gathered at the bottom of the autoclave, plus a quantity of cooler water from an overhead valve. This spraying continues for 10 to 12 min. The bottles are then ready to leave the autoclave at the reduced temperature of 170 to 180°F.

They are then conveyed by the *Monorail* to the annexe of the loading bay for natural cooling.

The procedure used here for sterilisation has been arrived at as a result of considerable research and experiment, for the immense size of the autoclaves created problems which did not arise in smaller plants, particularly in connection with the question of the complete exhaustion of the air.

Elaborate tests were made with the help of thermo-couples, which indicated the temperatures at various selected points. Physicists from the National Physical Laboratory, and scientists from the National Institute for Research in Dairying of Shinfield, Nr. Reading, took part in the experiments, as a result of which the system now in use was found to be the most efficient and practical.

The sterilising plant is served by three Lancashire boilers.

**Mechanical handling**

One of the mechanical features of this dairy, which is impressed on the visitor at almost every turn of the eye, is the *Monorail* system, which serves the whole of the internal transport requirements of the dairy, and from which the bulky stillages are suspended for easy handling by a coupling unit. It is believed that this system is unique for milk handling in this country.

The ingenious drawbridge which enables the stillages to be run right into the autoclaves has already been mentioned.

At the loading bay there is a hoist beam some 15 ft. long which takes the full stillages and lowers them direct on to the waiting lorries and trailers, and then lifts up again to run-on level with the rail system. This deck hoist can pick up six loaded stillages at a time.

At the required intervals, there are routing junctions on the rail system—they would hardly be called points, as they are fixed—and the alternate routing is affected by raising a guiding collar, by means of a lever, in the head of the suspension unit.

The work of moving the stillages along the *Monorail* is considerably expedited by the use of a battery driven manually operated truck.

The dispatch deck is usually busy all day from 7.30 a.m. until late in the afternoon. The milk leaves the dairy for delivery to the firm's Midland depots by lorries and trailers, the trailers being capable of carrying eight stillages and the trucks five.

Fork lift trucks are in use at the firm's larger depots, which act as distributing centres for pasteurised milk from the main dairy, as well as the specially processed milk from the sterilising dairy which we have been considering.

The milk is taken from the suburban depots to the waiting customers in electric runabouts. Birmingham is one of the dense centres of population where there is a heavy demand for sterilised milk. This is a tribute to the care with which the milk is treated at every stage in a modern dairy, of which the Midland Counties sterilising unit is an outstanding example.

SOME SUPPLIERS OF EQUIPMENT

Washer and cappers: *R. W. Webster and Co., Ltd.*
Overhead track system: *Herbert Morris, Ltd.*
Bottle filling machines: *Albro-Fillers and Engineering Co., Ltd.*
Sterilisers: *John Thompson (Dudley), Ltd.*
Boilers: *Edward Danks and Co. (Oldbury), Ltd.*
*A.P.V. Co., Ltd.*
Heaters, filters and holding tanks:
Refrigeration equipment: *York Shipley, Ltd.*
"Power tug": *Lansing Bagnall, Ltd.*
Time recorder/controller: *Foxboro-Yoxall.*

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▶A description of the manufacture and properties of homogenised milk is contained in the current issue of the *V-Belt Journal*—J. H. Fenner and Co.'s house organ. The new Bradford premises of the company's West Riding branch are described in the same issue.

▶The testing of brine *p*H is reduced to the simplest possible procedure in the new APV *Brine Testing Book*. Each book, which is waistcoat pocket size, contains three polythene wrapped booklets of papers, covering *p*H ranges 5·2-6·7, 6·8-8·3 and 8·4-10·0. Colour reference charts, within booklet covers, simplifies the reading of *p*H values. Each is described as good for at least 20 tests and costs 2s. 6d.

# Beverage Filtration Equipment and Its Management—2

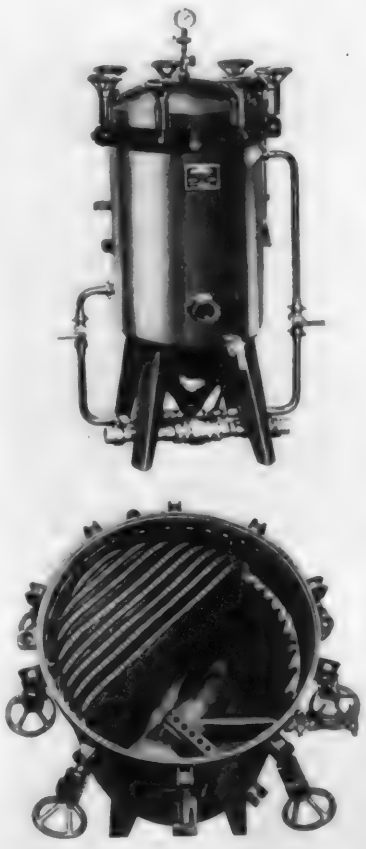
By George B. Beattie

**In "FOOD MANUFACTURE," April, the author discussed filtration techniques for soft drinks, wines and cider. In the concluding part of this article he outlines the principles of successful beer filtration and the characteristics of the plant available.**

### Filtration of beer

FILTRATION here is virtually confined to the non-deposit types of carbonated ales and stouts. The product has usually been chilled to about 30-33°F. in order to pre-deposit as much as possible of the load of undesirable nitrogenous material and particularly the haze-forming protein/tannin complexes. There are three groups of beer filters, pulp, diatomaceous earth and sheet, any one of which may be used solely, or any combination of the three employed, while of late years centrifugation has also come into the picture either as an adjunct to filtration or, less often, as the only clarifying method—apart from chilling. Roughers or auxiliary filters of sponge, cloth, metal mesh screens, etc., are now seldom encountered though not entirely defunct.

The basic essentials of the pulp filter are relatively unchanged, although many interesting refinements have now been embodied in the various modern machines. Pulp is pure cellulose fibre, usually cotton, but sometimes with a proportion of linen, and the modern trend is to incorporate a little asbestos, generally not exceeding 2%, the sharp "needles" of which prevent "balling" in washing. The complete outfit comprises one or more pulp filters, which are of the "press" variety, a suitable mechanical pulp washer and a hydraulic press for converting the loose, washed pulp into cakes of the shape and size required by the particular filter. Pulp filters appear first to have been used for cider in the 1890s, but were introduced from Germany to this country for chilled non-deposit beers about 1900.[33]

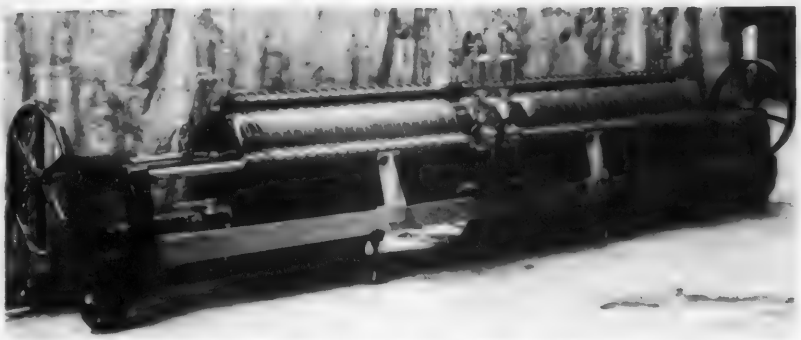


**Two views of the APV "Bowser." This particular filter is made from FDP stainless steel with Monel metal sections and is not suitable for liquids containing $SO_2$.**

Pulp filters function partially mechanically but chiefly by adsorption, a much finer degree of clarification being obtainable than at first glance would seem possible from an examination of the considerable width of the interstices between the fibres. The main advantage usually claimed for pulp filtration is that the treatment does not rob the beer of its head-forming and palate-enriching colloids; but against this, there is an appreciable danger of infection, skilled attention to the packaging of the filter is essential, and extra labour is needed for washing the filter mass. Pressure differentials across the filter, too, may lead to lack of uniformity in respect of the filtrate.

Unit designs vary, but the most popular "cakes" are 2 ft. dia. by 2 in. thick and circular in shape. They are often used in filter shells or presses taking either 11 or 22 cakes. To make the cakes, a mass of clean wet pulp is introduced to the open hydraulic press and spread around the central column, two fine-mesh screens being laid on, after which a similar amount of pulp is spread over the screens which serve to reinforce the cake. Hydraulic pressure is applied, compressing the cake and shedding most of its water content. The cake is then removed by a special lifting tool and inserted in the filter case, a meshed grid being placed against the cake to secure it. The cycle is repeated until the whole of the cakes and grids are in position, the assembly then being tightened and locked by means of a hand-wheel at the end of the (usually) horizontal filter. In starting, air is purged by a snift cock, expressed water from the cakes then emerging there. Gradually beer begins to flow through when the vent is closed and the outlet faucet slightly opened. At first, only water issues, then a mixture and finally 100% beer, when the filtrate can be passed along for use, tests ensuring that the beer is issuing undiluted.

When the pressure across the pulp filter has fallen by about one atmosphere, the filter is backwashed, then dismantled and the pulp recovered and washed in a



**Beer pulp filter made by Geo. Adlam and Sons.**

special "pulp washer," usually a circular tank with means for thorough agitation by circulating pump or propellor or both, heating arrangements of various kinds being incorporated. Soaking with agitation for 20 min. at 160 to 190°F. is usual, higher temperatures leading to "knotting," but chemicals are also often employed.

Thus, in the "Storey" method,[34] after 20 min. at 180°F. in 0·1 sodium carbonate solution, intensive cold water rinsing is given, then with the liquor bulk reduced to one-half, ½ hr. in hydrogen peroxide solution 0·25% by volume is provided, with finally cold water rinsing for 2 hr.

Foy[35] suggests hypochlorite sterilisation, but with a strongly adsorptive material like pulp there is some danger of ultimate off-tastes being imparted to the beer. The quaternary ammonium compounds could possibly be used effectively, although there are two disadvantages here: (i) expense, the pulp adsorbing a large quantity of the "quats";[36] (ii) it has been found that traces of quaternaries have a beer-foam depressant action.[37] These cationic bactericides, especially used in conjunction with non-ionic surface-active wetters, however, are most useful in sterilising the interior of filter cases, after they have been well cleaned; although some of the older sterilants, such as chlorine compounds, formalin, etc., may come out cheaper and can also have their penetration increased by addition of various wetters.[38]

With a 22-cake filter, the aggregate surface area is about 150 sq. ft., and with a "clean" beer, up to 1,000 barrels (36,000 gal.—1 barrel = 36 gal.) may be filtered before stripping down, output being up to 40 barrels per hr. Combined methods include: pulp filtration following centrifugation, kieselguhr before or after pulp, or sheet following pulp; while two-chamber pulp filters, *i.e.* to give double pulp filtration, are sometimes used. However, in many modern bottling depots pulp has given place entirely to sheet or kieselguhr, with or without prior centrifuging.

**Diatomaceous earth filtration**

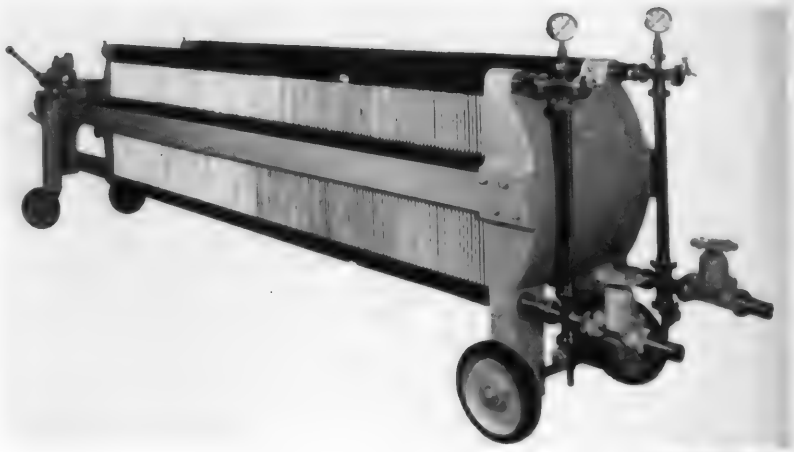
Kieselguhr filtration of beer has made the most rapid strides probably in the U.S.A., where the beers are lagers and high brillancy is demanded; but both on the Continent and in Britain the use of diatomaceous earth as a filter medium has increased apace during the last two decades. While there are several different designs, the following types are among those most widely used. Kieselguhr comprises a mass of the siliceous shields or "shells" of myriads of microscopic diatoms, these "external skeletons" of minute fossil plants being of various shapes, some round, some triangular, rectangular, hexagonal, etc., some needle-like, others in spatula form. In mass, the carefully purified kieselguhr forms an almost ideal filtering medium, the variety of shapes aiding the packing phase while ensuring that porosity is maintained. If the human population of the U.K. were instead composed of diatoms, it would pack into about 0·75 cu. inch. Kieselguhr filters are used as sole clarifiers—mainly in the U.S.—as rough to medium filters, followed by pulp or sheet, or less often, as actual polishers following some form of roughing-out. As a rougher, the kieselguhr filter has the great advantage that it takes an enormous load off the sheet filter, obviating early clogging of the latter. As to styles:

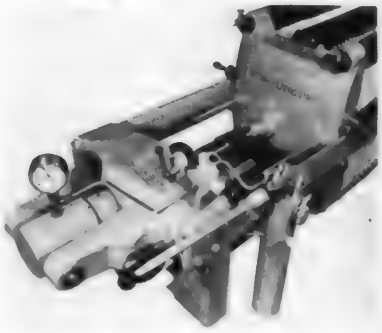
1. A typical U.S. design, now manufactured by a well-known British company,[39] is a cylindrical vertical filter, the filter-bed being retained by meshed screens. The filter aid bed is formed on an assembly of vertical Monel metal screens, being held thereto by differential pressure. Each easily detached screen comprises two layers of fine Monel mesh, with a coarser spacer screen between the two. The screens are supported by a metal frame, and the beer is passed through the filter-bed in the central space, being forwarded through an outlet spigot to the discharge manifold at the tank or case base which is of stainless steel throughout and tested up to 100 p.s.i., although the normal working pressure does not exceed 50 p.s.i.

This type of filter operates in conjunction with a slurry feeder, also similarly tested and in stainless steel. It has no moving parts and holds a reserve supply of filter aid slurry, the full plant comprising a rough beer feed tank, the filter proper, the slurry tank, a beer force pump, a bright beer tank and interconnecting pipelines equipped with valves, pressure gauges and cocks. The rough beer is top pressured at 10 p.s.i., to the pump which passes the beer through a special back pressure valve (4-5 p.s.i.) thus forcing a small amount of rough beer through one valve which controls the slurry feeder pressure and through another which controls the rate of filter aid "entrainment." On starting, a further valve is set to recirculate the beer, with the two valves above open. This enables slurry to be "eroded" at a high rate from the base of slurry feeder, a sight glass being provided in the pipeline, and recirculation is allowed to continue

until the beer therein is brilliant. The recirculating valve is then manipulated so that the filtrate is discharged to the bright beer tank which is also top-pressured at approximately 10 p.s.i. The "entrainment" valve is set to provide just sufficient filter aid feed to ensure continued brilliancy. During pre-coating (recirculation) slurry feeder pressure is 4-5 p.s.i., higher than the filter pressure, and when normal filtration begins the pressure drop across the screens should be not more than 1 p.s.i., this increasing as filtration continues to a maximum of 25 p.s.i Three sizes are made, 30, 108 and 220 barrels per hr.

This class of filter is very easy to clean and sterilise, about 0·25 to 0·33 man hour only being occupied with, under usual conditions, only one clean-out per day. The whole arrangement is very compact, and the patent "vortex eroder" controlling the slurry feed is automatic in action and can be lifted out for thorough cleaning.





**British Filters' PB60HA Mark III filterpress with plastic plates. The filter is opened and closed by means of a ram shown on the right.**

**2.** One of the best-known British types of kieselguhr beer filter[40] operates in rather a different way. The filter pack is built up from metal rings which are $\frac{7}{8}$ in. external diameter and $\frac{5}{8}$ in. internal diameter being flat on one side and scalloped on the other with a clearance of 0·003 in. exactly. When a number of these rings are placed one over the other and mounted on a fluted rod, they form a strong pipeline with a large number of precisely dimensioned slots throughout its length. An end cap screws down to lock the assembly and a number of these "pipes" are grouped together to provide in the aggregate a very high filtering surface, the filter aid from a slurry introduced, filling up the slots. The full assembly comprises the filter proper, a cylindrical vertical case containing the multi ring-column assembly as above, a filter aid slurry chamber, a slurry injector and the interconnecting pipeline system with recirculating by-pass, non-return valves, gauges, cocks and sight-glasses. Various metals are used, but stainless steel for the case with Monel for the interior assembly is a favourite combination.

The slurry chamber has a quick-opening door, the filter aid being admitted and the cover closed. The beer flows along a pipe on which the injector is mounted and enters the body of the latter, filling it entirely, air being automatically snifted off. The beer flows up one side of the vertical branch of a tee on which the slurry container is mounted and down the other, causing turbulence at the top on the underside of a plug cock separating the slurry chamber from the tee. When this cock is open, filter aid is brought down into the beer stream by this turbulence and entrained in the beer which passes on to the filter proper. Two sight glasses are provided, revealing how much filter aid is being added, and by setting the cock according to a scale, exact control can be effected. Once that is done, changes in the rate of flow are automatically compensated for, there being no danger that too much or too little kieselguhr is being added. In short, the whole operation is conducted by the beer flow itself, the slurry chamber holding enough for a large barrelage of beer.

The whole assembly is compact and is frequently mounted on a bogie on strong wheels or castors for mobility. The general method is to pre-coat and when the beer is coming through brilliant to adjust matters so that just the correct amount of added filter aid is entrained. In some older models, the "make-up" filter aid was positively pumped into the beer stream.[41] All sizes of filter are available from 5 barrels per hr. capacity up to over 200 barrels per hr.

**3.** A third type of kieselguhr filtration which is growing in popularity in Britain as in the U.S. and on the Continent is a modification of the well-known pattern horizontal filter. While some interesting alternatives have been proposed, the most widely used medium is the "double washable sheet." These are very porous fabric sheetings, highly scuff-resisting and of great wet strength. They do not filter the beer themselves but act purely as supports for the kieselguhr bed, without interfering with the rate of flow.

They are cleaned rapidly by hosing and have an average life of 20-30 cycles.

In the particular make[42] the writer has in mind, this patented sheet is used exclusively, being supplied for use with 20, 40 or 60 cm. square filters or for any other standard size of normal sheet filter. The general assembly comprises a standard sheet filter frame on a chassis with fixed and moving end castings, a varied number of plates and turbid chambers supported on runner bars and the usual tightening spindle. Plates and chambers have raised shoulders gripping the sheets hung over each plate, pressure being exerted on the edges so that no leakage can occur. The "eyes" of plates and chambers form the channels for collection and distribution of the beer, being provided with balloon type rubber washers to give a seal under internal pressure.

In operation, a pre-coat is formed by the usual means of recirculation, and once filtration proper has started, a controlled uniform proportion of slurry is passed by a dosing unit into the rough beer main, thus enabling the filter to continue for from 6 to 10 hr. duty without interruption, after which the turbid chambers will usually be full. The filter is then drained and opened, the coating of filter-aid adhering being effectively hosed from the sheets, still in place, by a blade-jet of water. Plates and turbid chambers—which link together—are of special aluminium alloy protected by an inert corrosion-resisting coating; or they may be had completely in stainless steel alloy. With double-stage plate filters, this principle makes it a simple matter to combine kieselguhr filtration with sheet filter "polishing," the first chamber being equipped with the kieselguhr coated sheets and the second with any type of cellulose/asbestos sheet desired. The full layout comprises a rough beer tank, suitable pump, a dosing unit, the filter itself and a bright beer tank. A popular dosing unit[43] is made in four sizes and is mounted on small wheels for mobility, accurate controls being incorporated.

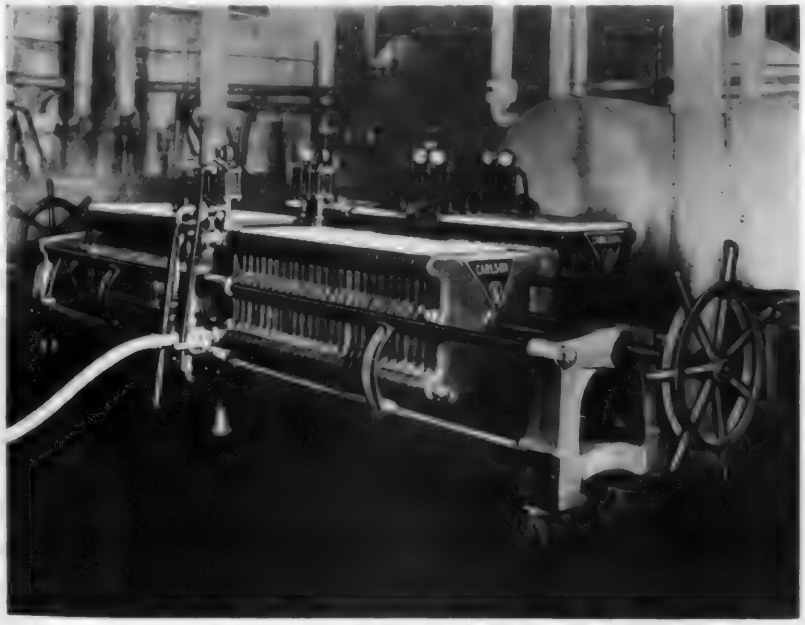
**Plate and sheet filtration**

The term "filter press" is used in two quite distinct senses (i) to denote expression devices operated hydraulically or otherwise to provide a high pressure for the winning of, *e.g.* juices from fruits, oils from seeds or nuts, etc., the original material being usually encased in fabrics; (ii) to indicate a horizontal or vertical arrangement of unit members to take a series of filter sheets, mats, canvas, wire mesh or other media through which a liquid is forced under pressure while the several units are held tightly together under screw or hydraulic pressure.

It is only the second class which concerns us in dealing with beer, and then, aside from the cloths holding kieselguhr as previously noted, by far the most widely used medium is the cellulose/asbestos sheet, which was originally devised in Germany by Seitz but is now universal, grades from "rough" to "germicidal" being available, the greater the proportion of asbestos, usually the closer the filtration, though many other technical factors are involved. The *EK* sterilising sheets were introduced in 1929 and are widely used for sterile production of unpasteurised beers. A wide range of open and close clarifying and polishing sheets is also available,[44] including very fast sheets for the handling of "bottoms," preferably employed with filters having extra large turbid chambers, while for pre-filtration, special manufacturing methods are often employed to increase adsorption.

*Sterimats*, which are mats made from cellulose fibre plus mineral constituents,[45] operate chiefly by adsorption, and in the brewery are principally employed for cold sterilisation purposes. However, they have a much wider range of use, special grades being manufactured which remove colloidal matters, others specially designed for air sterilising, some for viscous liquids and yet others designed for the most rapid general clarification. There are at least 7 different sterilising grades, a dozen or more clarifying ones and a number of others designed for specific purposes.

It may be convenient at this point to mention, too, that the filter press type of machine can also take all manner of fabrics, including fibreglass cloths, twill, woven or unwoven felts, swansdown, etc., with or without various filter aid additions; such fabrics being reused many times.



**Carlson combined kieselguhr/sheet filter installed at Wm. Younger and Co.**

Again, woven wire meshes of monel, stainless steel, etc., can also be utilised when special sealing gaskets are employed. Woven plastics of various types have also been used, and a recent addition is a sheet of a special grade of porous, unplasticised polyvinyl chloride sheeting, available in two grades capable of removing all particles down to $1\frac{1}{2}$ and 10 microns respectively.[46] However, for beer by far the most widely used medium is the cellulose/asbestos sheet or mat in its numerous grades.

Beer filter presses are mainly of horizontal format with rectangular frames and sheets, although this generalisation has its exceptions. A large variety of sizes are available, and we can divide the group roughly into single and double filters. Some typical examples are as under:

(a) This press comprises a framework of *Hiduminium* castings tied by plastics-coated steel bars carrying the detachable moving end, sealing pressure being applied from a thrust screw. Plates —which can be either chambered (for liquids of high solids content) or double-ribbed—are 40 cm. square and may be of aluminium alloy coated with synthetic lacquer, capable of steam sterilisation, or for corrosive liquids, laminated asbestos bonded with thermo-setting resins. Fittings may be of stainless steel, bronze or other materials.[46] In one modification of the standard model, the filter is erected on a tubular chassis mounted on four strong castors for mobility, the motor and bronze gear pump being neatly underslung with push-button control. Similar filter presses with 60 cm. (2 ft.) square plates are available, some having a hand-operated hydraulic pump and ram attached to the thrust screw in both single stage and double stage models. The filter area with a 40 cm. plate is 1·46 sq. ft., and with a 60 cm. plate 3·25 sq. ft., machines of up to 75 and 101 plates respectively being available.

(b) In another firm's[42] range, the same two standard plate and sheet sizes are employed, and the filters can be used for double filtration by the simple fitting of a change-over plate, this, of course, approximately halving output. Standard single or double stage types are initially supplied in the 60 cm. 2-stage type from $2 \times 40$ plates, taking 78 sheets, up to $2 \times 150$ taking 298 sheets, and in the single stage type from the 20 plate, 19 sheet pattern, to the 150 plate, 148 sheet size, the double range of output being from 8-10 barrels of beer per hr. up to 35-40; the single range, 4-6 up to 35-40. 40 cm. single types are available down to 1 barrel per hr. size with 10 plates and 9 sheets. While various materials, some to customers' specifications, are used, a fairly recent addition is the introduction of stainless steel in which filter plates, cocks and connections are all of this same material, thus eliminating all possibility of electrolytic corrosion.

Whether single or double filtration of beer is desirable, is often debated. Technically, some form of dual treatment is nearly always advantageous, and the double filter press is very convenient as the two units are mounted on the same stand, yet two very different treatments can be accorded, *e.g.* roughing and polishing by an open grade sheet in the first section, a close one in the second, or by kieselguhr in the first, a polishing sheet or mat in the second; or, again, a clarifying sheet may be used in the early section with an *EK* sheet or *Sterimat* in the later one. Triple filtration, in which fine metal gauze screens would be used in No. 1 chamber, kieselguhr or a clarifying sheet in No. 2 and a sterilising sheet in No. 3, but the writer has not so far encountered such a unit in use for beer.

**Bottoms**

We cannot leave beer without a word on treatment of "bottoms" and returns. The centrifuge is particularly valuable for the preliminary treatment of these, but quite a number of brewers use filtration only, and it is specifically claimed that, by adjusting the dose, injector type kieselguhr filters can handle bottoms as readily as clean beers. Filter presses of the double type are also very useful, as the precipitated albuminous particles can be removed by kieselguhr or a coarse sheet in the first section, mould, yeast and bacterial cells and spores being removed by sterilising sheets employed in the second chamber.

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[40] The Metafiltration Co., Ltd.
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[42-44] John C. Carlson, Ltd.
[45] T. B. Ford, Ltd.
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## The Fruit Annual

Recent progress in the prepackaging of fruit and vegetables is one of the subjects dealt with in the 1956-57 edition of this yearbook and directory.* Improvements in fruit packages, and an international register of fruit packs are supplemented by a chapter on palletisation.

Production, exports and imports of fresh, frozen, dried and canned fruit, edible nuts and of tropical fruits are dealt with in reports covering the whole world. The shipping section lists regular and tramp shipping lines, details of their cargo vessels, routes regularly covered, and a geographical index of fruit shipping lines.

The reference section consists of the fruit supplies calender, a dictionary of trade terms in six languages, trade organisations and specialised journals, including FOOD MANUFACTURE.

The world directory lists more firms than before, and is divided in the following sections: Exporters and Packers, Importers and Wholesalers, Canners, Dried Fruit and Nut Trade, Transport and Storage, Packing Materials and Equipment, Trade Marks and the Classified Buyers' Guide.

* *The Fruit Annual*, 1956-57. British-Continental Trade Press. Pp. 600. £1 net.

*Above:* **Cutting New Zealand lamb with a large electric bandsaw.**

*Top right:* **Display of "Superfrost" products from frozen meat to grills, steak and mince.**

*Right:* **Packing, wrapping and heat sealing on one machine.**

# Flying Start for Frozen Steaks

THE story behind the production of *Superfrost* prepacked frozen meat goods at John Connell's two-storey factory in Bromley, Kent, is highly unusual if not unique in the history of frozen foods. As an importer of frozen meat and a member of the National Association of Wholesale Distributors of Frozen Foods, John Connell was invited to speak at one of the Association's luncheons. It is said that he painted such a glowing picture of the future of the frozen meat industry (see FOOD MANUFACTURE, May, p. 193) that he was deluged with orders on the spot, although he had not even considered making his own frozen packs. He started to do so immediately, and Superfrost Meat Packers, Ltd., is the result.

On the factory's ground floor are the cold store and preparation bays. Carcasses from slaughterhouses or docks are unloaded straight into the cold store from which they are systematically taken for breaking up on electric band saws. One of these saws can handle more than 5 tons of meat per day. Then smaller saws take over, cutting the meat into small joints, chops, steaks, etc.

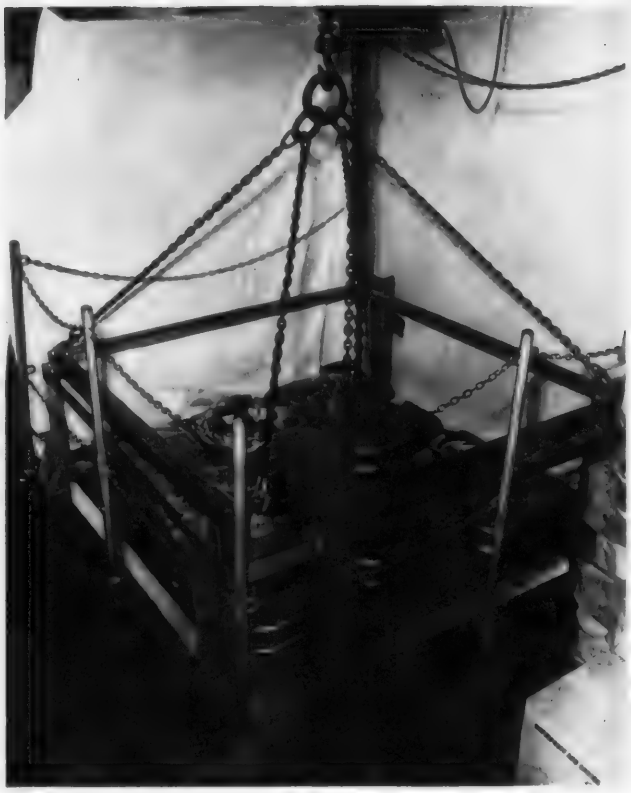
Great emphasis is placed by Mr. Connell on observing hygienic conditions. Preparation rooms are cleansed constantly, and there are several stringent inspections daily.

The chops and joints fall off the saw into hygienic trays and are continuously taken by lift to the floor above, where a team of women packers, in freshly laundered white coats and caps, take over.

### Packing

The packing department, completed in 1956, is a large, pleasant and airy room, steel and glass partitioned; this contains white plastic-topped tables and weighing machines. Here, from 8 a.m. onwards, an imposing variety of chops, steaks, joints, and grills are weighed, priced, and hygienically packed in trays, each containing a layer of greaseproof

paper. The trays are then fed into an American-made wrapping machine which is claimed to do the work of forty girls. The trays pass along the fast-moving conveyor belt into the machine, emerging wrapped and heat-sealed in transparent film. The machine packs 38 trays per min. (hand packing takes two min. for each tray). The trays are then inspected, packed into cartons, and removed to the upper section of the cold store to await despatch by insulated and refrigerated vans to all parts of the country.



**Lift which continuously carries meat from the cutting room on the ground floor to the packing department above.**

**£250 million trade**

Mr. Connell first attempted to sell frozen meat packs during the days of Government control, and ran into difficulties owing to import restrictions. Now he feels that within 5 years the trade in quick-frozen meat packs will amount to more than £250 million, of which, he says, Superfrost Meat Packers will take its fair share.

## Food Inspection

MANY OF the books produced for the use of sanitary inspectors are of poor quality, and it is a pleasure to be able to congratulate both Mr. Stewart Swift, formerly Chief Sanitary Inspector for the City of Oxford, the general editor, and the publishers on this series, to which another volume* has been added under the title *Food Inspection*. This is one of the most useful books on the subject it has been my pleasure to read.

The food manufacturer can look at a volume such as this from two angles: firstly, to enquire what is the sanitary inspector's outlook, especially in view of the renewed emphasis on hygiene in food legislation; and secondly, for real knowledge. In neither case will he be disappointed with this book. Mr. Swift has gathered together a team, which includes Prof. K. E. Cooper, professor of bacteriology at Bristol University, Mr. L. S. Stroud, chief sanitary inspector for Slough, Mr. C. Ash, senior meat inspector for Fareham U.D.C., Mr. P. J. Fisher, chief sanitary inspector for the Borough and Port of Fleetwood, Mr. W. E. Cooke, chief sanitary inspector for Bingley U.D.C., and Mr. H. Hill, who is well known as an author on food poisoning problems.

The book is divided into fourteen parts: Anatomy and Physiology of Food Animals; Bacteriology in Relation to Food; Slaughterhouses and Animal Slaughter; Post-mortem Conditions of Healthy Animals; Those of Diseased Animals; Meat Products and Canned Meats; Poultry, Rabbits, and Game; Fish; Vegetable Products and Beverages; Milk Production and Distribution; Milk Products; Preservation of Food; Adulteration of Food and Drugs; and Food Hygiene.

Each part is divided into chapters, and whilst there are references to literature on numerous pages, some parts also give a general bibliography at the end of the last chapter. There are numerous illustrations, though the reviewer was most interested in those showing 47 different types of fish. In general these are admirably drawn in order to bring out differences in related species, but the one showing the periwinkle is slightly out of perspective.

Naturally in a work of this type there must at times appear to be a lack of proportion from the manufacturer's standpoint, thus sausages get 6 pages, potted and cooked meats 12 pages, canned meats only 3, and bacon and ham 2 only. From the public health inspector's angle, however, the proportion is better, because generally he is more concerned with the manufacture of small goods, than of large-scale production, where scientific control is more general.

This is a good volume to have for general reference and guidance.

THOMAS MCLACHLAN.

* *Swift's Sanitary Officers' Practice: Food Inspection.* Edited by Stewart Swift. Butterworth, London. Pp. 732+xiv+60 (Index). 70s. net.

# Advances in Food Technology

**CHOCOLATE**

***Determining Yield Point***

Recent publications on the rheological conditions of chocolate masses reveal differences of opinion, especially on the question of the yield point. In contrast to Newtonian liquids, where the viscosity is proportional to shear pressure and velocity decrease, plastic masses of the kind used in the chocolate industry require an extraneous force to become liquid. The viscosity of plastic substances can therefore not be measured by capillary and nozzle viscometers, and even the rotary viscometer can only be used if the velocity decrease is sufficiently great. Disregard of this requirement has recently led certain research workers to the erroneous conclusion that chocolate masses show no plastic flow.—J. Kleinert, *Gordian*, 1957, **56**, 1351, 20.

**FRUIT JUICES**

***Ascorbic Acid as a Stabiliser***

Ascorbic acid has found wide application not only in supplementing vitamin content, but also in preventing oxidative degradation of foods. Many foods are sensitive to exposure to air and liable to oxidation, particularly fruit products. These have a tendency to go brown, not only as a result of atmospheric oxygen, but due to the oxygen already contained in them.

This browning, which may be enzymic or may be catalysed by metals, can be prevented by the addition of ascorbic acid. As it is a natural constituent of the fruit, it is harmless, and its use is permissible in most countries.

Ascorbic acid preserves the flavour, fresh colour, and aroma of fruit juices, and is particularly recommended for expressed juices which still contain particles of fruit flesh. The solid form of the acid is easily soluble, and should simply be added directly before bottling. Contact with copper or iron should be avoided.

The quantity to be used depends on various factors, such as the natural ascorbic acid content, the method of processing, etc. In general, 50 to 200 mg. ascorbic acid per litre are adequate, and any surplus ascorbic acid not consumed in preventing oxidation (in which it is itself oxidised) serves to increase the vitamin C content of the juices. It is necessary to add 250 to 300 mg. per litre to guarantee a concentration of 150 mg. free ascorbic acid in the final product.—W. Hausheer, *Reichstoffe und Aromen*, 1957, 3, 83.

**OYSTERS**

***TBA Test for Deterioration***

A simple modification of the 2-thiobarbituric acid test for oxidative rancidity has been adapted to oysters. The test may be performed directly on oyster tissue without previous extraction of the fat.

As measured by this test, refrigerated cooked oysters have a definite induction period during which the TBA values do not increase over those for freshly cooked samples. At the end of the induction period there is a very rapid increase in the TBA values which corresponds closely with the development of "rancid fish" odours. Uncooked refrigerated oysters do not show consistent increases in TBA values nor do they develop rancid odours.

The "rancid fish" odour, and elevated TBA values typical of oysters cooked enough to inactivate catalase, have been retarded by the addition of an antioxidant preparation (butylated hydroxyanisole).—M. G. Schwartz and Betty M. Watts, *Food Research*, 1957, **22**, 1, 76.

**MEAT**

***Tenderness of Beef***

Tenderness studies on beef have been aimed at finding out what structure or components account for variations in tenderness from one cut of meat to another. Chemical analysis of the collagen and elastin in the connective tissue showed wide variations from one muscle to another. Histological studies confirm this. On heating to normal cooking temperatures (60 to 80°C.) collagen content decreases while elastin is unchanged. Breaking strength measurements made on individual muscle fibres show a gradual increase (decrease in tenderness) with increasing temperatures in the normal cooking range, regardless of the muscle.

The results are used to explain the observed changes in tenderness in various muscles during cooking as follows: some muscles, such as *psoas major* in the loin, show a gradual decrease in tenderness on cooking. This is due to protein changes in the muscle fibres as measured by breaking strength. Other muscles, such as *semitendinosis* in the round, lack tenderness in the raw state and show a marked increase in tenderness between 50 and 60°C. This is due to a softening of the collagen present in large amounts in these muscles. This softening is greater in magnitude than the above-mentioned decrease in tenderness in the muscle fibres and is superimposed upon it. In the final cooked state tenderness is determined by two factors: the decrease in tenderness due to the action of heat on the muscle fibre, and the elastin content of the connective tissue.—A. Cornwell Shuman, C. K. Davies, Jr., E. E. Smith. Paper presented to American Chemical Society (Division of Agricultural and Food Chemistry), April 8, 1957.

# Machinery and Equipment

### MINCER AND CRUMBER

A machine, originally designed to break down root crops and vegetables for animal feeding, has now been developed by its makers, George Tweedy and Co., Ltd., to perform a variety of functions. They say it can be used for reducing broken and misshapen biscuits, etc., to meal for re-use; crumbing bread for rusks; powdering cereals for re-use; screening sugar, salt and other granular materials; pulping vegetables for soup-making and for many other operations.

The machine, known as the *Peck-Mix S.A.*, is said to be easily cleaned, contains no knives to break or to keep sharp and is easily operated by unskilled labour. It measures only 36 in. × 24 in. × 35 in. and is powered by a 5 h.p. motor. Tweedy's will place one of these machines at the disposal of a prospective customer for a fortnight to enable him to make his own tests.

### FROZEN MEAT SLICER

The *Hydro-Cut* frozen meat slicer is being offered by J. C. Wetter and Co., Ltd., which they say is capable of reducing blocks of hard frozen meat, or similar materials, into slices or strips of any desired thickness.

The machine operates on the guillotine principle actuated by hydraulic pressure. The speed of the knife and the number of cuts per minute can be adjusted at will.

**Wetters "Hydro-cut" frozen meat slicer.**

Wetters say that several well-known manufacturers of meat products have installed this machine, and claim that it is capable of doing the work of three bandsaws and that savings by eliminating sawdust waste may amount to as much as 3% or 4%. The machine should therefore pay for itself in a short time when dealing with large quantities of frozen meat.

The *Hydro-Cut* is made in four different types for hand feed, and it can also be supplied complete with conveyor feed to speed up production still further and to ensure absolute uniformity of slices.

According to size of model and method of feeding an output of up to 9 tons per hr. can be obtained.

The machine is strongly built to stand up to continuous duty, and corrosion resisting materials are largely used.

**New "Hilgeland" sausage drier which is claimed to dry sausages in 45 sec. (hog casings) and 30 sec. (sheep casings).**

### SAUSAGE OVEN

The new *Hilgeland* all-purpose oven made by Foodtech, Ltd., is built in two compartments, comprising one smoke chamber and one cook-and-douche chamber. The sausage goods, hung on rods, are wheeled into the chambers on trolleys, and as no handling is involved in the complete operation, time is saved and breakage and cooking loss are prevented. Cooling is effected by means of a douche fitted inside the cooking chamber. The thermostatic control allows for unskilled operation and built-in glass inspection panels avoid unnecessary opening of the doors.

As smoked sausage goods have an improved flavour and remain fresh for a longer period, the oven is intended for frankfurters (1 hr.), luncheon sausage (1½-3 hr.), Vienna sausage, hams, patties, pressed beef, "Bungs" and all other types of cooked sausage. Hard sausage (salami) can be matured in only four days.

The oven can be built with as many chambers as required. An average compartment (holding 80 lb. frankfurters, or 300 lb. luncheon sausage) costs £300. The ignition is by gas jets, or electric element, and the cooking by steam.

Delivery is 8-10 weeks and installation and demonstration are free.

### GLAND PACKING

A new gland packing, *Superlon*, which has been developed by Crane Packing, Ltd., is claimed to have the widest range of application of any so far produced, and should simplify the ordering, stocking and fitting of gland packings over a wide range of services.

It is a multi-service packing equally suitable for water, steam, oils and solvents, or chemicals and acids in moderate strengths and concentrations. The temperature range is from −40°F. up to +500°F. It is also very flexible, so

that any one spiral of a particular section will accommodate several shaft sizes, thus reducing the number of diameters of spiral it is necessary to stock.

Chemically inert *Fluon* plastic is used in the manufacture of this packing. Neither metallic elements nor graphite is included and the packing can, therefore, be used on services handling food products.

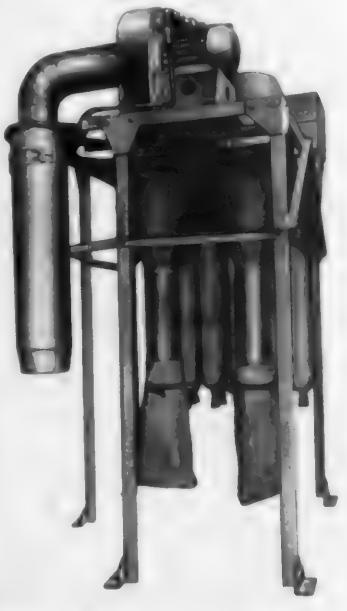
### SACK CLEANING MACHINE

A self-contained unit claimed to dry clean 300 sacks per hr. is now being manufactured by W. S. Barron and Son, Ltd. They say the action is searching yet gentle and does not involve beating or any other scouring action to wear the sack. Dust and residue from the sacks is extracted and collected into two sacks and frequently the material recovered in cleaning pays for the cost of the whole installation.

To operate, the sacks are held under the cleaning nozzle and then pulled away. This process is repeated, which ensures that both sides of the bag are thoroughly cleaned. If necessary for very high outputs three operators can be conveniently spaced around the nozzle and the bags will be cleaned as quickly as they can be presented to the nozzle.

No further equipment is required since the motor, air collectors and air filter bags are all included in the one unit. The latter ensures that no dust escapes into the surrounding atmosphere.

The plant is of all-metal construction and is designed for heavy continuous use with the minimum of attention and maintenance. If required it can be supplied without motor to drive off an existing line shaft.



**Sack cleaning machine.**

### DEIONISERS

Laboratory deionisers which provide conductivity water from tap said to be equal to triple quartz distilled water, are produced by Elga Products, Ltd., under the name *Elgastat*. A cartridge exchange service simplifies regeneration.

In a typical application, using the *Elgastat* laboratory deioniser type B.105, the storage tank is filled with tap or river water. This passes through a mixed bed of *Elgalite* ion exchange resins when, it is claimed, purified water, equal to three distillations in quartz may be drawn instantly at the rate of up to 6 gal per hr. Effluent quality can be constantly checked by an integral conductivity meter. Depending on the quality of the raw water, one cartridge will purify between 8 and 75 gal.

**"Giusti" stainless steel pressure vessels.**

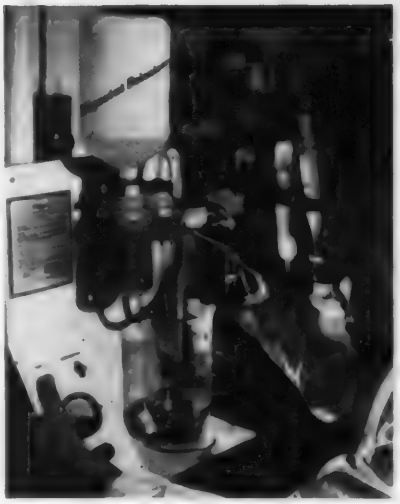
### STANDARD VESSELS

A new range of standard production stainless steel vessels announced by T. Giusti and Son, Ltd., is claimed to be suitable for all storage and mixing requirements and for heating and cooking.

Storage and mixing vessels are offered in a variety of types and in capacities ranging from 10 to 2,000 gal. Standard models are fabricated from 18/8/1 (EN. 58 B) stainless steel and are offered with alternative types of top edge stiffenings, legs, lids and outlets, depending on the size and purpose of vessel and gauge of material.

Giusti produce hemispherical jacketed vessels ranging from 7 to 500 gal. Inner vessels are of dull polished stainless steel and jackets are in mild steel. Alternatively, the jackets can also be offered in stainless steel.

The range of dished jacketed vessels from 25 to 200 gal. is in two types; one has a bolted-on jacket whereas the other has a welded jacket. From a construction point of view they are similar to the hemispherical vessels.



**Laboratory deioniser.**

The standard vessels are designed for a working pressure of 40 p.s.i. and are hydraulically tested to 80 p.s.i. Variations to suit individual needs and specific insurance requirements are, of course undertaken. Turbo or anchor type agitators, cooling coils, etc., can be provided to special request.

### STENCIL MACHINE

A machine for cutting flexible oilboard stencils is made by the Diagraph Stencil Co., Ltd., who say an average address stencil can be cut in less than a minute. The machine is manufactured in two sizes and the punches and dies can be replaced in a few minutes without dismantling the machine. The makers say that provided the *Diagraph* is not used for cutting material other than stencil oilboard, the punches and dies remain sharp indefinitely. The spacing and alignment are automatic.

The flexible oilboard stencils can be used on curved and irregular surfaces.

### DUAL-PURPOSE VENTILATOR

A new combined ventilator and fire safety measure was exhibited by Colt Ventilation, Ltd., at the Factory Equipment Exhibition last month Known as the Colt "Fusible Link Ventilator," the dual purpose unit is said to ensure the exhaust of smoke and heat in the event of fire (whether or not the ventilators are open) and during normal conditions to fulfil ordinary ventilation requirements.

The company also displayed their oil-fired air heater and the *Colt* "Two-way" fan which is claimed to be the only window fan which simultaneously extracts stale air as it brings in fresh replacement air, using only one fan impeller.

### "ALL-IN-ONE" CONVEYOR DRUM

Further details of their "revolutionary" conveyor drive unit (see FOOD MANUFACTURE, May, p. 210) have been released by A. and F. Mountain, Ltd. Known as the *Joki*, this Swedish-made motorised conveyor drum, which is being distributed by Mountains in the U.K., is a complete unit with the motor and necessary gearing contained inside the drum itself. There are no external fittings.

Mountains claim that this design has many advantages. Apart from the savings in space, they say that assembly is greatly facilitated since the axle journals do not revolve. The whole of the interior of the drum forms an oil bath, which automatically lubricates both bearings and gears. At the same time the oil flows over and through the motor and acts as a coolant. The insulation of the motor is of oil-resisting material, and the drums, according to the distributors, are suitable for operation in an ambient temperature of up to 200°F. Other advantages claimed are practically noiseless operation, minimum guarding and greater cleanliness.

According to Mountains, these drums cost little more than the conventional drive.

**Transparent model of the "Joki" motorised conveyor drum showing internal mechanism and coolant oil bath.**

### AUTOMATIC LUBRICATOR

An automatic multi-station lubricator is being sold by A. A. Jones and Shipman, Ltd. It is claimed to operate on an entirely new principle. The unit works quite independently of the machine to which it is fitted. The advantage of this is that it allows the oil discharge to be determined at will, irrespective of the diameter, speed, or mechanical construction of the machine. Known as the *Electromatic*, it is suitable for any machine needing oil in addition to those where it is essential that the oil is isolated from the product under manufacture. Any possibility of localised action is eliminated. The oil is discharged and conveyed to any predetermined point of lubrication through transparent plastic tubes.

The unit is operated by a small geared synchronous motor which can be supplied in any voltage according to requirements to give a wide variety of speeds, which determines the oiling time cycle.

The distributors say that once installed, the lubricator requires practically no attention. Working on a simple mechanical basis, its moving parts are constantly submerged in oil and are subjected to very little wear. The oil container is of adequate dimensions holding sufficient oil for about 200 working hours under normal factory conditions. Since the *Electromatic* lubricator is not geared to the machine it may be used on all types of machinery. Time frequency between oil deliveries of each station can be from ½ min. upwards. On the types of machines for which it is intended, full use can be found for the large number of available feeds and it is specially advantageous because it enables oil to be conveyed to different places, which are often almost inaccessible to an operative.

### DRIP PROOF MOTORS

A selection of British Standard drip proof and fan-cooled motors including two items recently introduced which are interchangeable with the existing range were shown by Brook Motors, Ltd., at the British Industries Fair from May 6 to 17. These are a fan-cooled slip ring motor with internal rings, and a crane motor in either cage or slip ring type. The single phase power pack; a complete low-priced unit intended mainly for agricultural machine driving, low in cost, reasonably damp and dirt proof, compact with high starting performance, consisting of protected or fan-cooled motor with either hand-operated or automatic push button starter was shown.

The 1,000,000th Brook *Gryphon* fractional horse power motor was a special feature and there was a wide variety of f.h.p. motors in many types and enclosures. The smaller size B.S.42 range and the recently introduced *Merlin* domestic appliance motor were represented.

Control gear covered hand-operated and automatic push button starters, and a comprehensive range of push button stations and limit switches.

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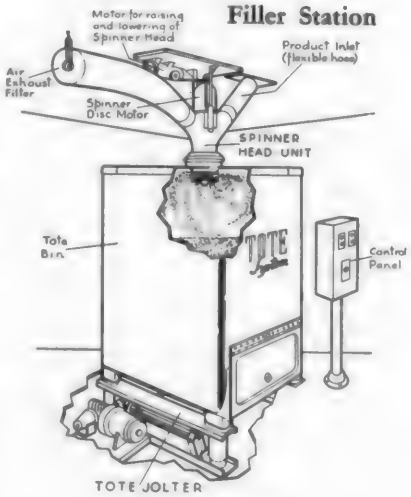
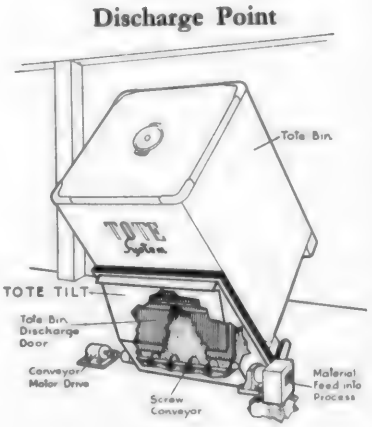



**Screw Type Tilt Unit**

### TOTE IN BRITAIN

The Tote system of bulk handling powdered, liquid or granular materials (see FOOD MANUFACTURE, May, p. 218) is now available in this country and was demonstrated last month by the Bulk Handling Division of Pressoturn, Ltd. Fifteen tons of sugar in 10 Tote bins was unloaded and stacked from a lorry in just under 13 min. by one man using a fork truck. Using a pedestrian controlled electric truck, a girl took one of the bins—containing about 30 cwt. of sugar—to the tilt discharger and discharged it into the processing equipment.

As can be seen from the above diagrams, the system consists essentially of the Tote bin, made of heavy gauge aluminium in capacities of 42, 74, and 110 cu. ft. and containing a 9-in. filling aperture and a 34-in. × 14¾-in. discharge door; the spinner head unit and the jolter to ensure full capacity loading of fine powders; and the tilt discharger.

The units are claimed to save 25% of the space usually required for bulk materials storage without employing double-stacking. Double-stacking can, of course, be used where space permits.

# News Digest

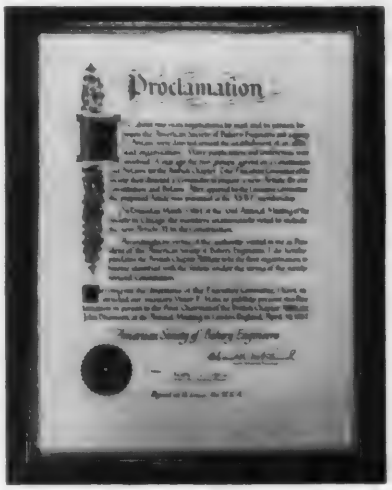
## Common Market Issues Discussed by Guinness' M.D.

### SIR HUGH BEAVER AT FOOD MACHINERY ASSOCIATION LUNCHEON

References to the proposed European Common Market in the Food Machinery Association's annual report were commented upon by Sir Hugh Beaver, the Association's principal guest at their recent annual luncheon. Sir Hugh, who is president of the Federation of British Industries, the new president of the Institution of Chemical Engineers and the managing director of Arthur Guinness, Son and Co., recalled the alarm that arose when tariff reform and Imperial preference was first suggested. "We have never had a *status quo* in which to operate and we never will have a *status quo*," he declared.

Sir Hugh continued: "The nations of Europe have become very conscious of the fact that unless they could learn to live as one and in harmony they would be as a grain of wheat between the upper millstone of the U.S.S.R. and the nether millstone of the U.S.A.—if any of us nowadays knows what that ancient piece of food machinery was like!" In his capacity as president of the F.B.I. he had told the Chancellor of the Exchequer that industry was concerned lest there should not be enough time for the final decision and lest they should not have all the facts and the detailed proposals before they became irrevocably committed. The Chancellor replied that the principle of our association with the six countries in a free trade area should be approved as soon as possible; he fully agreed that industry should have all the necessary time to study and understand the facts. The F.B.I. is keeping its members advised of developments.

The other speaker at the luncheon was Mr. J. S. Clayton Marshall, the newly elected president of the Food Machinery Association, who greeted the guests. Referring to the journalists present, he said: "Our Technical Press is of a very high standard, and much of our business comes from their sustained efforts."




*This illuminated Proclamation, declaring the legal affiliation between the American Society of Bakery Engineers and its British Chapter, was presented to Mr. John Thomson (Allied Bakeries, Ltd.,) chairman of the British Chapter, at its annual meeting recently. The presentation was made by Mr. Victor E. Marx, secretary-treasurer of the American Society. Since the meeting Mr. Marx has been touring the Continent and expects to return to the U.S.A. this month.*

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**Food research fellowship**

To encourage basic research in subjects affecting the food manufacturing industry, a Junior Fellowship at Sheffield University is being sponsored by Batchelors Peas.

Making the announcement recently Col. Maurice W. Batchelor, chairman of the firm, said that his company would, in the first instance, provide £500 a year for three years.

To be known as "The Batchelor Fellowship" the award will provide for post-graduate research in the Department of Microbiology or Biochemistry and the Fellow may work for the degree of Doctor of Philosophy.

The University will select a graduate this summer and the appointment will commence in the autumn.

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**Egg import controls urged**

Local authority representatives are urging Mr. Heathcoat Amory, the Minister of Food, to take action without delay to enforce stricter control over the imports of frozen egg and dried egg albumen.

This follows enquiries by the health committee of the Association of Municipal Corporations into the experiences of member authorities with frozen egg stocks.

The committee says that it has told the Minister that in its opinion there is only one certain way of preventing the use of contaminated egg and the food poisoning which it causes. This is to ensure that all imported frozen egg and dried egg albumen are sampled immediately upon arrival in this country and held pending the result of the examination.

The committee has told the Minister that any stocks found to be contaminated should be destroyed immediately.

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**Food additives conference**

A conference on the control of chemical additives in food will be held at the Royal Institution, London on July 26. It will be a joint meeting of the Food Law Institute of the U.S.A., the division of Food, Drug and Cosmetic Law in the section of Corporation, Banking and Business Law of the American Bar Association, the Food Group of the Society of Chemical Industry, the Society for Analytical Chemistry and the Association of Public Analysts of Gt. Britain.

The morning session, from 10 a.m. until 12.25 p.m., will deal with the control of food additives other than antibiotics. The chairman will be Charles Wesley Dunn, president of the Food Law Institute, and four papers will be contributed by speakers from the U.S., Canada and Gt. Britain. Time has been allowed for general discussion.

The afternoon session, from 2.30 p.m. until 4.30 p.m., will deal with the control of food additives with special reference to antibiotics. The chairman will be Sir Harry Jephcott, chairman of Glaxo Laboratories, Ltd., and chairman of the advisory council of the Department of Scientific and Industrial Research. There will be three contributions, again by speakers from the U.S., Canada and Gt. Britain, and a general discussion. Fuller details will be published later.

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**Report on bakery education**

A combined report has been issued by the National Joint Apprenticeship Council for the Baking Industry and the National Board for Bakery Education, for the period September 1, 1954 to August 31, 1956. The joint report has been rendered as under reconstitution the work of both bodies has been streamlined and considerable consolidation has taken place.

# Fish Imports and Sugar Prices Worry Federation

## MR. HEATHCOAT AMORY FACES CRITICISM AT F.M.F. LUNCHEON

Fish, sugar and complex food regulations were among the current problems of the food industry discussed by the president of the Food Manufacturers' Federation, Mr. R. S. Worth, C.B.E., at the association's annual luncheon in London on May 22. His remarks were directed to the principal guest, Mr. D. Heathcoat Amory, Minister of Agriculture, Fisheries and Food.

The fish canners, said Mr. Worth, were suffering badly from imported packs. For instance, something like 12,000 tons of South African pilchards were entering the country in competition with about 2,700 tons of Cornish pilchards. If nothing was done about this the Cornish industry, established with Government encouragement, would collapse. Secondly the Herring Industry Board was fixing uneconomically high prices for herring for canning and did not seem particularly sympathetic to the representations of the canners. Thirdly motor car makers were bartering their products for sild and, perhaps, tuna fish.

Turning to sugar, Mr. Worth said that the price was much too high. Furthermore, the Sugar Board's system of alternating surcharge with distribution payments favoured the manufacturer buying sugar in regular quantities in contrast with the man dealing with a seasonal pack who, of course, had seasonal requirements which would not necessarily coincide with the repayment period. He thought that the Sugar Act was a good one but that the administrative machinery was not yet working properly.

Another criticism from Mr. Worth, was that food regulations should not be made too complicated. "We will always strive to protect the consumer but we don't want the position on standards, labelling and hygiene, etc., to be so complicated that we need to take Counsel's advice on every move we make."

Discussing efficiency ("the old-fashioned word for productivity") Mr. Worth said that the industry was very conscious of improving its standards. "Besides this individual effort," he said, "I should also mention what are at the moment rather modest efforts by the Federation itself in this field. We have set up a Technical Advisory Committee with special sub-committees in order to endeavour to assist the industry generally with advice in technical matters, and we have very special liaison arrangements with the Food Machinery Association, the Glass Manufacturers' Federation and the British Closure Manufacturers' Association in order to help in the general search for greater efficiency.

"In the education field we have given our continuing support to the National College of Food Technology. I will not go into the details of what we have done except to say that among other things, we have started scholarships at the College and very much look forward to the new building which the Ministry of Education is putting up at Weybridge."

In his reply, Mr. Heathcoat Amory dealt first with the general picture. In 1956, despite Suez, Britain finished up £230 million on the right side of her overseas trading account. The food industry had helped by increasing its exports which were now 25% up on 1955. During the past 12 months the cost of living had risen 1½%, the quantity of food bought had increased by 2% but its cost was down 2%. He congratulated the industry on helping to make this possible. Britain was now better fed than ever before.

Buying habits were changing and there was an increasing demand for convenience foods. This was a challenge to the industry.

Mr. Amory parried the president's criticism of regulations by saying that his Ministry did not make them for their own sake. However, they were necessary. In this connection, the regulations for permissible food colours would soon be issued. Sausages had given him much food for thought in terms of regulating their composition.

Turning to foreign trade, the Minister said the Government wanted to get as high a level of international trade as was possible. That was why they wanted the Free Trade Area in Europe. However, agricultural and food products would be excluded owing to the need to look after the home and Commonwealth producers. The Government did not like barter transactions but would accept them where absolutely necessary to freeing trade.

On the subject of herrings, he said that the rule was that minimum prices were fixed by himself and the Scottish Secretary of State. They would do their best to keep everyone's interests in mind.

It was unfortunate that so soon after its establishment the Sugar Board had to face record high world prices of sugar. However, he thought that it was unquestionably right that the Board should have been set up and that the Government had withdrawn from sugar trading. They did not want to change from surcharge to distribution payments too frequently but "action would be taken at the right moment." In conclusion, Mr. Amory said that we were probably entering a period of plentiful food supplies with the prospect of intense competition. This emphasised the need for top quality, and new processes.

# PEOPLE

DR. H. G. SMITH, F.R.I.C., has been appointed the representative of the Department of the Government Chemist on the Food Standards Committee. He succeeds Dr. J. R. Nicholls, who has retired.

MR. R. D. RYDER, O.B.E., has been appointed by the Food Manufacturers' Federation as general organiser to its British Food Fair in succession to Mr. J. F. B. O'Shea, who has recently retired.

MR. FRANK FORTESCUE F.A.I., has been appointed chairman of the Yeatman Production Group, in succession to the late Mr. A. E. Mortimer Woolf. Mr. Fortescue has been a director and deputy chairman since 1943.

MR. HAROLD and MR. RONALD SKERMAN have recently been appointed to the board of directors of C. Skerman and Sons, Ltd. Both joined the company 12 years ago on completion of their war service and thus make the third generation of the family to continue the business which has been operating for over 80 years.

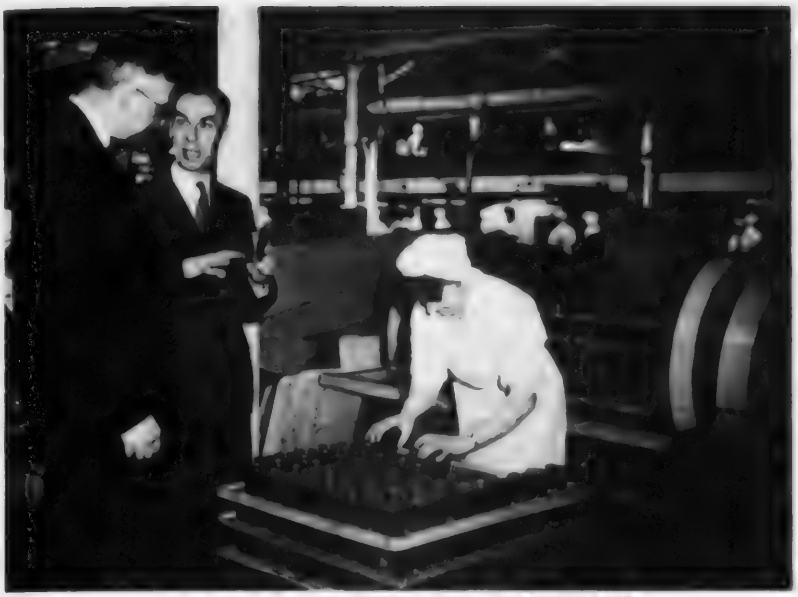
MR. J. B. H. KEMP was presented with an inscribed grandmother clock from his fellow members of the Self-Raising Flour Association in appreciation of his long connection with and services to the Association. The presentation took place at the Association's annual luncheon on May 3.

Mr. Kemp was present at the initial meeting of manufacturers on December 2, 1924, at which a committee was elected and on February 23, 1925, he was elected to the council when the constitution of the Association was considered and established. From that date he has served continuously and has held the offices of hon. treasurer and chairman.

MR. A. S. DODD has been appointed a director of John Thompson Water Tube Boilers, Ltd., and London manager of John Thompson, Ltd. At London office he succeeds MR. C. J. HOWARD, who was recently appointed managing director of John Thompson Water Tube Boilers, Ltd.

Mr. Dodd joined John Thompson at Wolverhampton five years ago from Merz and McLellan, where he was senior engineer at Newcastle-on-Tyne.

At John Thompson, Ltd., Belfast, MR. JAMES BOYD has been appointed area manager, to represent all of the John Thompson Group companies in Northern Ireland and Eire. In the latter territory, in respect of John Thompson Wilson Boilers, Ltd., he will co-operate with agents, William



## PLASTIC CONTAINERS FOR MARMALADE

*Mr. Donald Robertson, managing director of Jas. Robertson and Sons, showing Mr. Joseph Godber, M.P., joint Parliamentary Secretary to the Ministry of Agriculture, Fisheries and Food, the new plastic marmalade containers which have replaced the ½ lb. glass jars. Mr. Godber paid a visit to the London factory of Jas. Robertson at Catford last month. This is one of a number of visits which Mr. Godber is intending to pay to food processing factories in the coming months in order to fully acquaint himself with the industry and some of its problems.*

*Mr. Godber was welcomed by the managing director, and shown round the factory. He saw the various methods employed for producing the preserves made by this company, which has been established nearly 100 years.*

Peat and Co., of Dublin. He will open a new area office for John Thompson, at 26, Wellington Place, Belfast, where a drawing office for John Thompson Water Tube Boilers has been in operation for a year.

### Long service at Marsh and Baxter

Long service awards were presented recently to employees of Marsh and Baxter, Ltd., when Mr. E. E. Marsh, a director of the firm handed cheques valued £100 to two employees completing 50 years' service, Mr. H. Holloway and Mr. S. H. Boilstone, and gifts to over 200 other employees reaching the 25-year total of service.

Mr. H. R. Marsh also a director of the company, in referring to the bacon industry said that the industry supported by the N.F.U. is urging the Government to impose quantity restrictions on imports. The bacon market had fallen considerably, he said, in the past few months though he agreed that it had been far too high. Yet the industry needed stability of prices and in the past five weeks the price of No. 1 sides of bacon had dropped by just over 6d. a pound. The industry was very much at the mercy of competing countries who were often allowed to unload here.

As the rate of English production increased so the imports would be restricted and as some production slowed down so foreign produce should be allowed to enter in greater quantities. "We would much rather take a steady 2s. 6d. a pound for our bacon than 3s. 6d. for four weeks and then 2s. for five weeks," Mr. Marsh said.

The firm now has five employees with over 50 years' service and 28 with over 40 years' service.

### Mono Containers' half-century

Mono Containers celebrate their 50th year of establishment this year.

The sales of paper drinking cups continue to rise steeply and the demand for cream cartons is getting back to prewar figures.

Two new lines are being introduced this year; the new coloured foil lid for cream cartons, which replaces the conventional disc or "Push in" lid. And the new *Mono* light weight hot drink cup which holds 9 fl. oz. Special printing can be undertaken if required.

## OBITER DICTA

● In England's mild, moist air, my husband and I have discovered new subtlety in unchilled butter, cheese and tomatoes.—*American visitor to Britain.*

● It is impossible to obtain an analysis report concerning every delivery of milk. All a dairyman can do is hope that the cow has not let him down and that it is familiar with the regulations. —*Mr. David Hunter for a dairy firm cleared of selling milk deficient of fat.*

● Our witch-ridden past is nearer than the cosy subtopian might think. In parts of Norfolk, apparently, mice are still regarded as a cure for whooping cough. A versatile delicacy, they can be fried, boned and made up into sausage rolls, or stewed and the nourishing liquor drunk.—*Manchester Guardian.*

● "The contents of a bottle labelled "Special lemonade" had an unusual smell, the cause being the presence of a trace of paraffin; it is common experience that the smell and taste of paraffin are difficult to remove. It however, seemed unkind to use the word "special" to illustrate the peculiar qualities of this sample.—*Birmingham City Analyst.*

● What can be done, Great Yarmouth town council want to know, to stop people from eating fish and chips on buses? It is an offence for instance, for anyone travelling by bus to "cause injury or discomfort to any other person" and there are various prohibitions against "nuisance" or "disorderliness." "Fish and chips," though not mentioned specifically, might be covered by implication.—*The Times.*

● A frozen eight-course banquet including six tins of vintage wines, prepacked in a garish plastic container! That is the latest achievement of Snibbo, Ltd. Directions for thawing the wine will be found in each packet. There is no washing up to be done, as when the packet is opened it unfolds into the shape of a large dish in which all the food is contained. For the wine no glasses are needed, as each tin has a spout to drink from.—*"Beachcomber" in the Daily Express.*

## COMPANY PROFITS AND PROSPECTS

### Cerebos' sales records

Sales of Cerebos' branded products (table salt, *Bisto, Saxa, Stag, Paxo* and Scott's range) reached record figures in both tonnage and value, reported the chairman Mr. W. A. Innes at the company's annual meeting. The net profit has increased from £714,658 to £791,770. The Ordinary dividend is held at 30%.

More money has been spent on the company's Middlewich factory and on re-equipment by the Australian company of its factory at Melbourne. Both operations are expected to be completed later this year.

*

### U.G.B. profits less

Two major warehouses fires occurred during United Glass Bottle's last financial year, which resulted in almost total destruction of the buildings and contents. However, the consequences of these mishaps were limited, reported the chairman, Mr. L. A. Elgood, because of the group's war and postwar policy of dispersal of operations over the widest possible area.

Although the group's net profit has been reduced to £533,088, as against £712,967 in the previous year, earnings for the period are considered satisfactory having regard particularly to price restraint during the year. A final Ordinary dividend of 7½% was paid.

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### £2 m. more biscuits sold

Group sales of United Biscuits, Ltd., reached £15,500,000 last year—an increase of £2 million over the previous year—announced the chairman, Mr. P. G. Macdonald. Reminding his shareholders that the price of the company's biscuits was reduced by 1d. per lb. in 1955, he pointed out that this price has remained stable in spite of increased costs and wages. "This has only been made possible by the continuing expansion in sales . . . and the greater use of mechanical and electronic devices both in the handling of raw materials and in the packeting of biscuits" said Mr. Macdonald. He revealed that the group has put on order an electronic computer at a cost of over £80,000 which will provide the most up-to-date figures to enable management to organise production with the greatest possible efficiency and will also undertake such operations as the compiling of weekly pay rolls, stores records and sales analyses.

Although the group profit before taxation was £146,571 higher than in the previous year, there remained after taxation a balance of £1,122,826 (£1,100,529). "It will be seen," said Mr. Macdonald, "that practically the whole of the increase in earnings has been absorbed by additional taxation." He urged that "we must all continue to press for further cuts in Government expenditure and so lighten taxation including estate duty."

A total dividend of 15% was made which is 1% more than last year.

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### Rising sales of Schweppes

Despite rising costs and the worst summer for 50 years, home sales of Schweppes for 1956 were 7·7% above the 1955 total.

Group net profit, before tax, however, dipped from £1·37 m. to £1·21 m. owing mainly to less favourable sales of *Kia-Ora* and *Pepsi-Cola*, two home subsidiaries, and its U.S. subsidiary sales.

Home sales of Schweppes products up to Easter this year have increased by 15% over 1956, and, stated Mr. Hanning Philipps, the chairman, sales of Schweppes (U.S.A.) show substantial rises for the first three months and suggests that the current year will be very much better.

The dividend was maintained at 17½%.

### U.K. Dubonnet plant enlarged

The increasing demand for *Dubonnet* in this country has led L. Rose and Co., Ltd.—sole concessionnaires of *Dubonnet* in the U.K.—to build a new extension to their St. Albans, Herts., premises. The new building was opened recently by M. Rene Lalou, director general of the Vin Dubonnet company.

The new extension, over 50 ft. high and with 5,300 sq. ft. of floor space, houses new blending and refrigeration plant as well as 22 storage tanks capable of holding up to 72,000 gal. of *Dubonnet*.

Tanker wagons from Vin Dubonnet company in the South of France are received direct into the company's rail siding and are unloaded by a stainless steel M.50 *Megator* pump supplied by Megator Pumps and Compressors, Ltd. The pump—which has a capacity of 3,000 gal. per hr.—pumps the *Dubonnet* directly into the plant and ensures a quick rail-head turn around. Inside the new extension two stainless steel R.16 *Megator* pumps are used to pump the *Dubonnet* between the blending plant and the storage tanks.

These pumps operate on the sliding shoe principle and are lubricated entirely by the liquid they are pumping, thus avoiding any contamination of the *Dubonnet* by oil or grease. Stainless steel was chosen to maintain the high standard of hygiene.

## Erections and Extensions

**J. and R. Snodgrass, Ltd.,** flour millers, are planning to enlarge their mill and warehouse premises at Anderston Quay, Glasgow, C.3.

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**W. B. Reid and Co., Ltd.,** brewers, are having a bottle store built in Claremont Street, Newcastle-on-Tyne.

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**S. and S. Goolnik, Ltd.,** cardboard box manufacturers, have had plans prepared for extensions to their factory in Clarence Road, London, E.5.

*

**Schweppes, Ltd.,** are to erect warehouse and office premises on the Dog Hill Farm Estate, Stockton-on-Tees.

*

**The Scottish Co-operative Wholesale Society's** mills are being remodelled, and next year the Regent Mills, Glasgow, will be the most up-to-date in the country, according to Mr. John A. Stirling, secretary of the society, at the presentation of awards at the annual bakery competition and exhibition held at Leith recently.

**London Co-operative Society, Ltd.,** are having a bakery and distribution depot erected at Loughton, Essex.

*

**Ash and Son (Devon), Ltd.,** wine and spirit merchants, are having a bottling works, store and offices erected in James Street, Devonport, at a cost of £22,000.

*

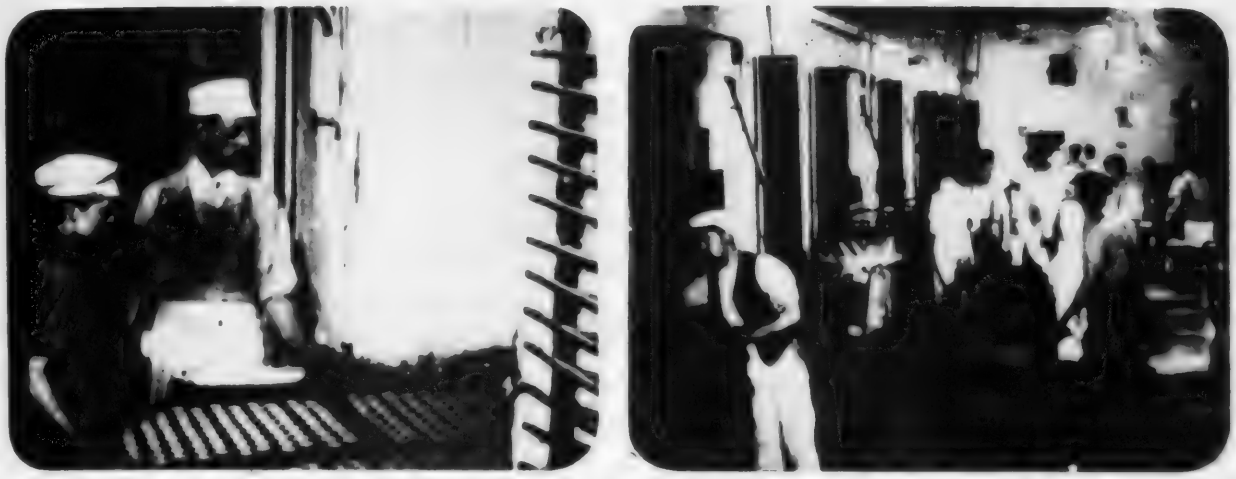
**Newcastle-on-Tyne Breweries, Ltd.,** are having a bottling factory built at Newcastle-on-Tyne, at an estimated cost of £600,000.

*

Work has been completed on the extensions to the factory of **Thompson and Capper, Ltd.,** at Liverpool. These extensions were necessitated by the increased demand for their tabletting service in all sections of industry.

*

**The United Co-operative Baking Society, Ltd.,** will commence work on a new bakery in Perth in the summer. This will be designed to produce cakes and smallbreads and is a further development of the U.C.B.S. chain of bakeries located strategically over Scotland.



## BISCUIT-MAKING AT PEEK FREANS IN 1907

*Two scenes from the 50-year-old film shown to over 200 of Peek Frean's oldest employees at the National Film Theatre recently (see p. 252). The showing was punctuated with cheers as veteran employees recognised themselves or old friends —mostly small boys—who showed no modern inhibitions about acting in front of a camera. One of the first attempts to use the cinema for advertising purposes, the film ran to 1,000 ft. compared with the average modern documentary "short" of about 50 ft. and provided a vivid contrast between biscuit manufacture 50 years ago and the present highly mechanised operations. After the showing Mr. Rupert Carr, managing director of Peek Frean, presented the negative to Mr. Basil Wright, chairman of the National Film Archive Committee.*

### Distillery revived

The new Bladnoch distillery in Wigtownshire, Scotland, will produce 3,000 gal. of whisky per week with a staff of 12, in contrast to the old distillery which employed 20 men to produce about 2,500 gal. per week.

The new distillery replaces the old Bladnoch opened in 1880 and closed down in 1939. Last year it was acquired by Mr. A. B. Grant, leading member of the Glasgow whisky trade who decided to invest in modern equipment.

The distillery will use oil fuel; all handling has been mechanised and controls incorporate a system of light and bell signals. A new system of heating will cut 12 hr. in production processes and considerable changes have been made in the method of serving one boiler from two stills. Output from the new plant is destined for the export trade.

### New company's deep-freeze plant

John Jackson (Frozen Foods), Ltd., have installed new deep-freezing plant at their depot in Hatchett Street, Birmingham. The temperature will be so low in the new depot that special floor-warming equipment has had to be installed.

A thermometer several feet below ground will record underground temperatures, the readings appearing on a dial in the freezing chamber. The warming equipment will come into service if the ground below the chamber becomes too cold.

John Jackson (Frozen Foods), Ltd., is a new company and its depot in Hatchett Street is capable of holding 60 or 70 tons of meat, poultry, fish, vegetables and ice-cream. It is claimed to be the most up-to-date and largest depot of its kind in the Midlands.

### Changes of address

Duttson and Knight, Ltd., have moved from Croydon to 17, Monument Street, London, E.C.3. (Telephone: MANsion House 5988. Telegrams: Duttson, Easphone, London). The address of their Bristol refinery remains unchanged.

The head sales office of Albright and Wilson, Ltd., has been moved from Park Lane, to larger premises at 1, Knightsbridge Green, London, S.W.1. Telephone: KENsington 3422. Telegrams: Albriwil, Wesphone, London). The new premises have been planned to allow further room for expansion. Subsidiary and associated companies at Park Lane have also moved. They are The Antelope Co., Clifford Christopherson and Co., Ltd., and Proban, Ltd.

The Middlesbrough branch office of Honeywell-Brown, Ltd., has moved to 52 to 60, Fletcher Street, Middlesbrough, Lancs. (Telephone: Middlesbrough 44221/3; Telegrams: Minnreg. Middlesbrough.)

### Agents for bottle cleaners

Farrow and Jackson, Ltd., are now the sole selling agents in the brewery and bottling trades for the range of *Moabrite* cleansers manufactured by Powell and Scholefield, Ltd.

The cleansers are in the form of dry powders and included in the range are detergents suitable for hydro bottle washing machines, brush bottle washing machines, etc.

### APV opens new spares and service department

The APV Co., have opened a new spares and service department at 47, Gatwick Road, Crawley.

A day, night and week-end service will be available, both for spares and essential service work.

The organisation is in the charge of Mr. Norman French, who has been well-known for several years to the dairy engineering customers of the company. He will be helped by Mr. L. H. Wright, who will be responsible for the internal organisation management of the spares side of the depot.

### New fire extinguisher

A new dry powder fire extinguisher, which is claimed to kill a fire in only a few seconds, has been announced by Nu-Swift, Ltd. By striking a knob, a cloud of fine powder is shot out under pressure and smothers the flames.

It has been specifically designed to combat fires on inflammable liquids of all types, including alcohols and industrial solvents and electrical equipment.

# Food News Overseas

### U.S. milk powder production up

The total U.S. production of non-fat dry milk in 1956 was 1,483·9 million lb., an increase of 73,866 million lb., or 5·2% over the 1,410·034 million lb. for 1955 according to figures announced at the American Dry Milk Institute's annual meeting recently. Showing a decrease of 5·8% from 1955, the total domestic sales were 746·7 million lb. Most end-users showed decreases.

The bakery industry leads in overall usage accounting for 272·3 million lb., or 36·5% of the total domestic sales. Dairy manufacture use continued in second place with 162·9 million lb., despite a 11·3% decrease from 1955.

Home-use, showing 12·7% increase over 1955, holds third place with 154·2 million lb. usage. Two other categories showed increases this year, meat processing 4·6% and confectionery 3·9%.

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### Synergist for food insecticides

Non-toxic pyrethrin insecticides for use on grains, fruit and other foods may benefit from the discovery of what is claimed to be an extremely effective new synergist or activator named *Sesoxane* for pyrethrum. The U.S. Department of Agriculture has announced that experiments suggest that *Sesoxane* is superior in synergistic activity to other commercial pyrethrin synergists, permitting a lower user cost in all pyrethrin formulations for equal knock-down and mortality. Higher mortality rates for insects can be obtained without the addition of DDT or other toxic insecticides.

Commercial manufacture is due to start soon at the Fine Chemicals division of Shulton Inc., New Jersey. A report on *Sesoxane* appeared in the February issue of our associated journal *Manufacturing Chemist* (p. 51).

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### S. African fishmeal output

A slight increase in the output of fishmeal, despite the fall in raw fish intake has been announced by the South African Fisheries Development Corporation, Ltd., in their annual report.

Two factors account for this, *viz.*, a relatively lesser diversion of catch to canneries in the industry based on the Union coast, and the coming into operation of additional stickwater plants, resulting in a higher proportion of meal produced to raw fish processed. The first factor was not dictated by market considerations, for indeed prices for canned pilchards have tended to be firm, but by the condition of the fish when delivered to the factories when it was not always suitable for canning due to the distance from factories at which the catch was effected. In this 12 months period there was an unusually high proportion of the catch taken from waters as remote from the processing plants as those of False Bay. During the course of the year the Corporation associated itself with representations to the authorities for an increase in the price of fishmeal on the local market. For some years past the industry had, under agreement, been supplying the local market with fishmeal at an average price of some £29 a ton as against an export value of up to £53 a ton f.o.b. The industry's contribution to the maintenance of a low national cost structure saddled it with a burden of about £600,000 a year, a burden which the downward trend in profitability of canneries and an upward trend in production costs made impossible to bear. As a result of these representations the local price was increased to £38 per ton.

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### Australia sells more fruit and wine

More than a million cases of Australian canned fruits of the new season's pack have been sold to British distributors since marketing began on January 28 this year.

A forecast that Australian wine sales will top the 2 million gal. mark within two years, was made by Mr. Colin R. Mackay of the Australian Wine Board. Present sales have passed the million gal. level for the first time since the war.

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### Value of meat agreement

Australia's beef cattle herds have an added value of £A30 million because of the recent Meat Agreement made with Britain, according to Mr. McEwen, the Australian Minister for Trade. In addition the resulting rise in land values had been enormous.

Mr. McEwen revealed that the Australian Government was now working out details for a renewal of the Wheat Stabilisation Scheme. Under the proposed scheme Australia would be able to negotiate with foreign countries on better terms for Australian exports, because of a lowering of some tariffs.

### Queensland-U.K. meat service

A regular monthly service from Australia to the U.K. by a fleet of four refrigerated ships, designed primarily to serve the Queensland chilled beef trade, will be inaugurated by the Blue Star Line in the second half of this year.

The ships will sail direct to the U.K. through the Torres Strait thus reducing time by 10 to 15 days. It is understood that each ship will carry from 1,200 to 1,300 tons of chilled beef and that these quantities can be increased.

It is hoped that by exporting a substantial proportion of beef in chilled form Queensland will establish itself in the British market against Argentine competition.

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### India plans dairy development

A proposal for erecting a suitable building for a central dairy in Delhi under the Dairy Development Scheme was discussed at an inter-ministerial meeting in New Delhi.

It is understood that the building will have a plinth area of 76,000 sq. ft.

The Delhi Dairy Development Scheme, for which aid is available from the New Zealand Government under the Colombo Plan, is estimated to cost Rs. 32·8 million. Aid from New Zealand will be in the form of a cash grant amounting to £800,000 and technical assistance. Another project —the Calcutta milk scheme—is being offered aid through F.A.O. from Australia, Canada, the Netherlands, New Zealand and the U.S.A. to the extent of $504,000.

The Delhi scheme provides for establishment of a colony of about 2,000 milch cattle and procurement of milk from villages in Delhi territory and adjoining areas. The milk procured will be selected and chilled at 46 chilling plants, each plant costing about Rs. 50,000. At present, it is understood, about six chilling plants will be established.

A large dairy for processing, bottling and distribution will be established in Delhi. A statutory board will also be set up.

It is expected that under this scheme about 7,000 maunds* of milk will be handled daily, including 5,000 maunds from the milk colony and 1,500 maunds from villages in Delhi territory. About 1,000 sales depots will be set up in various parts of the city for distribution purposes.

* One maund = 82⅔ lb.

# Packaging

### Polythene poultry packs

Following the successful sales of polythene-packed poultry at Christmas, the *Hypak* division of the Oppenheimer Casing Co., Ltd., are developing new methods of printing polythene packs. Using any variety of colours, these methods allow the packs to be overprinted and give the effect of "branding" to the produce of individual packs.

Oppenheimers claim that polythene packing eliminates dehydration and protects the produce from dirt, dust and flies.

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### Portable bag sealing attachment

The new patented *Faseal* portable bag sealing attachment has been acquired by the Thames Sack and Bag Co., Ltd., an associate company of William Palfrey, Ltd., and is now being marketed for the first time.

The attachment is a unit which closes a filled multi-wall paper sack by means of a *crêpé* strip fitted over the top. The strip also reinforces the sack against the weakening effect of stitching perforations. By incorporating a miniature guillotine, the *Faseal* enables the *crêpé* and the stitching cotton to be severed simultaneously. The attachment includes a mirror which gives the operator an unobstructed view of the entire sealing operation.

The *Faseal* is claimed to be the only attachment which can be used on a portable bag closer. It costs £7 10s.

**Fibrenyle, Ltd., have produced this 80 oz. capacity polythene bottle complete with taper seal polythene cap and a moulded-in polythene handle.**

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### Cheese in tubes

A new range of cheese "Snack Packs" by Wilts United Dairies is a significant move in the growing use of collapsible tubes for food.

The range comprises three cheese products—cheese spread, cheese and tomato, and cheese and celery.

**Aluminium tubes for new cheese products. Novelty is a star-shaped nozzle to help achieve decorative effects on canapes, etc.**

The fundamental problem which had to be overcome by Venesta (the tube makers) in conjunction with the cheese manufacturers was to achieve a tube which would have no chemical reaction with the product or *vice versa*. The result is an aluminium tube—6½ in long and 1¼ in. in diameter—internally lacquered with two coats of *Araldite*.

Secure sealing was achieved with the help of two other Venesta developments—automatic capping, and *Venseals* at the base of the tube.

The tubes have special star-shaped nozzles so that the cheese may be applied in a decorative form on canapes, etc. Each is distinctively enamelled and printed in three-colour combinations of white, cream, red, green, yellow and blue.

**Three examples of the new "window" bags with front panels made from polyethylene film.**

### Polyethylene window bags

A new type of "window" bag, with its front panel made from strong, transparent anti-static polyethylene film instead of from conventional cellulose film, has been introduced by the bag division of E. S. and A. Robinson, Ltd. It is claimed that the additional strength of polyethylene allows these bags to withstand more severe treatment than was previously practicable and reduces the likelihood of their tearing or splitting when subjected to constant handling. A further advantage is that polyethylene is not subject to shrinkage due to ageing or moisture.

Available in either strip window or full width window styles, these bags can be supplied in any size—plain, or if preferred, photogravure or Flexographic printed in multi-colour designs.

Their backing can consist of any type of paper, including *Glassine*, and Robinson's say that the extra stiffness provided by a paper backing facilitates faster packing speeds than with all-polythene bags.

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### Danish butter's new pack

*Lurpak* is the new name given to butter imported in packets from Denmark. The familiar parchment-lined silver foil wrapper has been redesigned to read "Danish *Lurpak* Butter" in red and blue lettering. The Lurmark has been given a prominent place across the front of the packet. This mark is the symbol of Danish quality products which are subject to constant routine checks and surprise checks.

A television and press advertising campaign is introducing the change of pack.

## Overseas Enquiries

### Trinidad: Foodstuffs

Lee Lum and Co., Ltd., of 31, Charlotte Street, Port of Spain, wish to obtain agencies for tea, spices, baking powder, icing sugar, frozen fresh fish, pickled salmon and mackerel, frozen fresh vegetables and fruit.

Manufacturers interested should write direct to the Port of Spain concern.

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### Jamaica: Spice grinding mills

The Antilles Trading Co. (Agency Department), 165/167 Princess Street, Kingston, wish to represent, on a commission basis, U.K. manufacturers of grinding mills for dry ginger, Indian corn and other spices of fibrous texture.

Interested manufacturers should write direct to Mr. E. E. Lee, The Antilles Trading Co. and send illustrations or catalogues and also prices and information about delivery where possible.

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### Panama: Food machinery

Industrias Lacteas, S.A., Apartado No. 4362, Panama, wish to import food processing machinery, mechanical apparatus, instruments and materials in connection with the development of their industrial activities. The firm has received permission to import, duty free, the machinery, mechanical apparatus and instruments for their new plants. Industrias Lacteas would like U.K. manufacturers of these items to send them catalogues and prices in U.S. dollars.

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### U.S.A.: Chocolate

Mr. Samuel Stone, food broker and manufacturers' representative, of 13 Sumner Street, Newton Centre 59, Massachusetts, would like to represent a U.K. manufacturer of "hollow chocolate" such as Easter eggs, chocolate figures, etc.

Manufacturers interested in this enquiry should write by air mail direct to Mr. Stone, quoting both f.o.b. and c.i.f. prices in U.S. dollars.

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### Belgium: Gin

S.P.R.L. Pierre Chateau et Cie, 17 Place Constantin Meunier, Brussels, wish to represent, on an exclusive basis, a British manufacturer of London dry gin. The company are agents for many French wine companies, for a Spanish sherry, French cognacs and other spirits and one Scotch whisky firm. They are considered to be a suitable connection for British firms.

Interested manufacturers should write direct to S.P.R.L. Pierre Chateau et Cie., at the same time, notifying the British Embassy, Commercial Department, 2 rue de Spa, Brussels, that they have done so.

### U.S.A.: Confectionery

Mr. Harold Jaret of Jaret Imports Inc., 2329 Nostrand Avenue, Brooklyn, New York, is interested in obtaining additional agencies for U.K. confectionery. As they sell to theatres Jaret Imports Inc. are interested primarily in novelties and in chocolate bars which are easily manageable and can be carried in the pocket. They would not be interested in hard candy unless it were packaged in such a form—*e.g.* in transparent cellulose bags—that it could be retailed for around 10 cents in a theatre.

## Technical Press Review

### *JUNE*

**Dairy Engineering.**—Floors for Dairies; Fuel Efficiency at Cricklewood; Care and Maintenance of Electric Motors in the Dairy, 2; Dairy Engineering 200 years ago.

**World Crops.**—Ratoon Rice; The Hawaiian Sugar Industry; Sugar-Beet Growing in the U.K.; The Mechanisation of Rice Production; Sugar-Cane Breeding in India; Rice in Spain.

**Manufacturing Chemist.**—Synthetic Analgesics and Antagonists, 2; Why Work in North America?; Evaporators for the Fine Chemical Industry; Progress Reports: Fertilisers, Disinfectants.

**Chemical and Process Engineering.**—Review of Instruments, Electronics and Automation Exhibition; Instrumentation of a Silicone Distillation Plant; Flow Measurement Using Electro-Magnetic Inductive Methods; Heat Transfer in Spiral Heat Exchangers; New Swiss Method for Evaporating Sulphite Liquor.

**Automation Progress.**—Job Timer Aids Coating; Automatic Arc Welding; Automatic Feed and Transfer for Resistance Welding; Control Technique in Central Europe; Flaw Detection by Ultrasonics.

**Petroleum.**—Organising Safety Precautions; Combating Fire Risks; The Oil Geology of America; Supplying the Services; Continuous Grease Production; Oil from Coal.

**Paint Manufacture.**—Organising a Paint Laboratory; Recent Developments in Metal Finishing; The Hiding Power of White Pigments; Significance of Colour Measurement; The Blooming of Nitrocellulose Lacquers; The Location of the Paint Industry, 3; Paint and Lacquer Additives, 3.

*For further details and specimen copies write to Stratford House, Eden Street, London, N.W.1.*

## Booklets Received

▸*Wine Fining with Spa Gelatine* is the title of a pamphlet by B. Young and Co., Ltd. Notes on the theory of fining are followed by practical advice on using *Spa* gelatine.

▸Technical details and specifications of their Mark I propeller fans and ancillary equipment are given by Woods of Colchester, Ltd., in two new leaflets (V 1220 and V 3644).

▸An illustrated description of the manufacture of *Stork* margarine is included in the latest issue of *Enchiridion*, house organ of Firth-Vickers Stainless Steels, Ltd. Coloured photographs of Van den Bergh's plant at Purfleet show milk storage and pasteurising tanks and other vessels made in *Staybrite* stainless steel.

▸Physical principles used in the meat industry are dealt with in a new circular (No. 25) distributed by the American Meat Institute Foundation. Among the more recent developments that are based on fundamental principles are injecto-curing techniques; the application of modern instruments for indicating and controlling temperature, humidity, air velocity, and smoke density in smokehouses; electrostatic smoking, high frequency heating for thermal processing of meat; irradiation with beta or gamma rays for sterilisation; temperature measurement based on change of electrical resistance with temperature: and the use of physical measurements to evaluate meat quality.

### Food Directory

As in the two previous editions, this directory* consists basically of seven main sections covering Food Manufacturers, Commodities, Plant and Equipment, Packaging Materials, Brand Names, Food Laws, and Consultants.

A further section has been added at the beginning of the volume giving the names, addresses, and principal executive officers of Government departments, research organisations, and trade associations directly concerned with food processing.

The section summarising Food Standards and Regulations throughout the world, including those of the U.K., has again been prepared by C. L. Hinton, F.R.I.C. In the U.K. sub-section the existence of a statutory order or a code of practice, for a particular foodstuff is precisely indicated. The latest proposals of the Food Standards Committee on Colouring Matters and Antioxidants have been included.

Revision of food regulations in several countries are recorded, and new sub-sections dealing with 16 additional countries have been included.

* *Food Directory*, 1957-8. Edited by R. De Giacomi. Tothill Press, Ltd., London. Pp. 758. 40s. net.

# Information and Advice

**This Service is available to subscribers to FOOD MANUFACTURE. If a stamped addressed envelope is enclosed replies will be sent by post. Enquiries cannot be answered by telephone.**

### Caramel

B.8181. *Can you let us have a recipe for the manufacture of caramel for use in the preparation of caramel wafers? The caramel or toffee should be of a consistency so that it does not stick in the cutting machines and should not become too hard during storage.* (Glasgow)

The following formula is said to be proven under manufacturing conditions:

| | |
|---|---|
| Sugar (Tate's 4ths) | 16 lb. |
| Granulated sugar | 16 ,, |
| F.C. condensed milk | 18 ,, |
| Invert sugar | 16 ,, |
| Hydrogenated palm kernel oil | 14 ,, |
| Salt | 2 oz. |
| *Cerelose* (powdered glucose) | 4 lb. |
| Butter | 2 ,, |
| Glucose (liquid) | 32 ,, |

Pre-melt the fat (H.P.K.O.) and pour it into the caramel cooker. Set the stirrers into motion, then add the milk, liquid glucose, salt, powdered glucose, and sugar in that order. The mass is allowed to mix thoroughly for a few minutes to create a homogenous mixture. Apply the heat, steam at 80 to 100 p.s.i., and cook to 238-240°F. Turn the steam off, add the butter and allow it to mix in. The caramel is then transferred to the hopper of the extruder.

### Curry powder

B.8178. *Can you give us a basic recipe for Madras curry powder?* (London, E.C.3)

We suggest the following recipes as a basis for experiment:

(1) *Curry powder.*

| | *oz.* | | *oz.* |
|---|---|---|---|
| Turmeric | 8 | Fennel | 2 |
| Coriander | 8 | Chillies | 2 |
| Cumin | 8 | Mace | 2 |
| Dry ginger | 4 | Cloves | 1 |
| Pepper | 4 | Mustard | 1 |
| Cardamom | 2 | Poppy seeds | 1 |

These ingredients are all ground to a fine powder and will make nearly $2\frac{3}{4}$ lb.

(2)

| | |
|---|---|
| Coriander | 4 oz. |
| Turmeric | 4 oz. |
| Cinnamon | 2 lb. |
| Cayenne | 8 oz. |
| Mustard | 1 lb. |
| Ginger | 1 lb. |
| Allspice | 8 oz. |
| Fenugreek | 2 lb. |

All ingredients should be dry. Grind to a fine powder and sift through a fine-mesh sieve. Mix thoroughly. Package in airtight, moisture-proof containers to avoid loss of flavour.

### Information supplied

The Enquiry Service has dealt with requests for names of manufacturers and suppliers of plant machinery and materials, and also general information as follows:

B.8075. *Spices.* (Beira, Portugal)

B.8077. *Uses of herring scales.* (London, E.C.4)

B.8079. *Literature on soup and its canning.* (Altrincham, Ches.)

B.8080. *Suppliers of lactose.* (Reading, Berks.)

B.8081. *Preparation of grated, dehydrated Gruyere cheese.* (Paris, 5)

B.8082. *Manufacturers of equipment for making popcorn.* (Yaba, Nigeria)

B.8083. *Manufacturers of plant for pasteurising liquid eggs.* (Glasgow)

B.8084. *Literature references to peanut packing.* (Glostrup, Denmark)

B.8085. *Production of potato flour.* (London, W.1)

B.8086. *Manufacturers of electronic coffee roaster.* (Las Palmas, Canary Islands)

B.8087. *Use of metal kegs in the draught beer trade.* (Liverpool)

B.8088. *Manufacturers of cleaners' trolley.* (Cinderford, Glos.)

B.8090. *Formula for cheese spread for tubes and formulæ for synthetic whipped cream and for meringues.* (Belfast)

B.8091. *Electronic cooking.* (Aarau, Switzerland)

B.8092. *Manufacturers of ice cream machinery.* (Adana, Turkey)

B.8093. *Preparation of soda biscuits.* (Singapore)

B.8094. *Manufacturers of paper napkins and tablecloths.* (Lisbon, Portugal)

B.8095. *Machine for peeling onions.* (Manchester)

B.8096. *Suppliers of small quantities of colours for pulled sugar work.* (Coulsdon, Surrey)

B.8097. *Sweetening dried, shredded coconut.* (Montreal)

B.8098. *Storing cheese remainders.* (Beira, Portugal)

B.8099. *Suppliers of dried fruit cleaning machine.* (Hove, Sussex)

B.8101. *Sorbic acid in foodstuffs.* (London, W.C.2)

B.8102. *Removing onion smell from hands.* (Trowbridge, Wilts.)

B.8103. *Formula for dry pack cordial mixture.* (Brisbane, Australia)

B.8104. *Use of flavouring enzymes.* (Brisbane, Australia)

B.8105. *Vacuum packing coffee in tins.* (Auckland, N.Z.)

# New Companies

**C. J. Atkins, Ltd.** (579556.) 276, New Road, Croxley Green, Herts. Bakers, confectioners, etc. £100. Dirs.: C. J. and Mrs. F. L. G. Atkins

**Auto Beverage Co., Ltd.** (579550.) Mfrs. of and dealers in automatic coffee and tea and similar machines. £10,000. Dirs.: R. F. Bilton, Rolston Hall, Hornsea, East Yorks., A. Roy and H. G. Periton.

**B.B. Bakeries (Ealing), Ltd.** (578664.) 66, Newman Street, London, W.1. £100. N. and Betty Bernardout.

**Banbury Bakeries, Ltd.** (579212.) £10,000. Subs.: J. W. Welford, Church Lane, Cropredy, Banbury, F. S. Warren and E. J. Hall.

**Banks Bakeries, Ltd.** (579178.) The Bakery, West Street, Harrietsham, Kent. £6,000. Dirs.: Emmeline A. and E. I. T. Banks, G. G. Banks and Patricia J. Waghorn.

**Henry Barry and Co. (Produce), Ltd.** (575962.) Monument Buildings, Eastcheap, London, E.C.3. Importers and exporters of and dealers in dried fruits, canned and fresh fruits, canned meats, etc. £5,000. Subs.: L. H. Edwards and B. Threadgould.

**Clavell Bate and Nephews, Ltd.** (578100.) Water Street Works, Nelson, Lancs. Designers, mfrs. of and dealers in wrapping and packaging machinery. £10,000. Dirs.: F. D. C. and A. C. C. Bate.

**W. J. Besseling and Co. (U.K.), Ltd.** 115-119, Moorgate, London, E.C.2. Importers, exporters, shipowners and carriers, dealers in canned meats and foods. £500. Dirs.: R. T. Kleykamp and J. B. Williamson.

**Bristol Frozen Foods (Wholesale), Ltd.** (578475.) 54, Redcliffe Street, Bristol. To take over business of frozen food distributor carried on at Bristol by S. E. Webb; to carry on business of mfrs. and processors of and dealers in ice cream, frozen and fresh foodstuffs, etc. £10,000. Dirs.: A. R. Lake and S. E. Webb.

**Charlie Charles, Ltd.** (579179.) Importers, buyers, sellers and merchants of meat, flour, fruit, vegetables, etc. £1,000. Dirs.: A. C., Mrs. L. F., and A. J. Charles, Mrs. L. L. Ellis.

**Cork Distilleries Co. (Exports), Ltd.** (579882.) 77, Portland Place, London, W.1. To act as agents for the Cork Distilleries Co., Ltd., Cork. £5,000. Dirs.: Capt. L. C. A. M. de A.-Borg and L. A. de A.-Borg and F. G. W. de A.-Borg.

**Cork Street Food Products, Ltd.** (578552.) 6, Vigo Street, London, W.1. £10,000. Dirs.: Jean M. Torin, L. P. Cooper and E. L. Manches.

**Coventry Confectionery, Ltd.** (578064.) 71, Stoney Stanton Road, Coventry. £100. Dirs.: A. A. Brayant and H. L. Knight.

**Cresco Confection Co., Ltd.** (579883.) Cross Row, North Side, Workington, Cumberland. Mfg. confectioners, etc. £2,000. Dirs.: W. Hodgson, T. Johnston and A. H. Fletcher.

**Cub Packing Co., Ltd.** (579723.) 23, St. Peter Street, Winchester, Hants. Packers, makers up, mfrs. of and dealers in goods of all kinds, canners, bottlers, packers, preservers, merchants of and dealers in foodstuffs of all kinds. £2,000. Dirs.: G. C. M. Makin and A. J. Sole.

**Deep-Pro (Quality Cuts), Ltd.** (579148.) 93, The Albany, Old Hall Street, Liverpool, 3. Dealers in frozen foods. £100. Dirs.: I. Barker and D. Hewitt.

**Perfection Foods, Ltd.** (580206.) Eanam Bridge Mill, Blackburn, Lancs. Mfrs. and distributors of cattle, pig, dog, poultry and horse foods. £25,000. Dirs.: W., J. and Kathleen Sharples.

**Pushbutton Sales, Ltd.** (579981.) 156, Strand, London, W.C.2. Mfrs. of and dealers in automatic and coin-worked machines for supplying food, drinks, etc. £100. Subs.: Jean Herbert and T. A. Herbert.

**Queensway Fisheries, Ltd.** (579528.) 1-2, Great Winchester Street, London, E.C.2. £1,000. Dirs.: R. W. and Mrs. D. G. Lowes.

**D. Randall and Co., Ltd.** (578359.) 17, Surrey Street, London, W.C.2. Mfrs. of and dealers in bakers' requisites, sundries, etc. £100. Subs.: G. R. Ramsell and S. E. Corbell.

**Smith Selmon and Co., Ltd.** (579755.) Devonshire Chambers, 146, Bishopsgate, London, E.C.2. Confectioners, mfrs. of and dealers in ices, creams, cakes, etc. £250. Subs.: P. Selmon, L. Barnett and H. Smith.

**L. J. Sorensen, Ltd.** (579974.) 96, Louth Road, Grimsby. To carry on any works, operations, transactions or dealings in connection with the fishing industry. £5,000. Dirs.: L. J. and Mrs. P. M. Sorensen.

**Sporik Chocolate (London), Ltd.** (579382.) 31, Kings Road, Sloane Square, London, S.W.3. £100. Dirs.: F. and Mrs. H. R. Sporik.

*These particulars of new companies recently registered have been extracted from the daily register of Jordan and Sons, Ltd., Company Registration Agents, 116, Chancery Lane, London, W.C.2.*

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# Recent Patents

**COMPLETE SPECIFICATIONS ACCEPTED**

775,696. J. Pascall, Ltd.: Apparatus for the production of dipped sweets.

776,977. Brooke Bond and Co., Ltd.: Drying or conditioning leaf or like materials.

776,565. P. W. Thornhill: Tea extract and process for producing the said extract.

776,630. D. Newland: Machine for making an edible product.

776,704. Unilever, Ltd.: Food products.

776,727. Arenco A.B.: Fish eviscerating machine.

776,740. Baker Perkins, Ltd.: Intermittent transfer gear for loading or unloading bakers' and like ovens.

777,029. R. W. Barraclough, Ltd.: Bag filling machines.

776,152. J. Lyons and Co., Ltd., and F. H. G. Heidges: Cartons and containers.

776,166. Monsanto Chemicals, Ltd.: Preservation of tea.

776,487. Wilson and Co., Inc.: Food containers.

776,522. W. H. Jacobs: Beverage dispenser.

# Trade Marks

**JELL OMAR.**—753,345. Marmalade and jams, all in jelly form; and lemon curd and mincemeat. **Spring and Co., Ltd.,** Riverside, Brigg, Lincs.

**JULIET.**—753,367. Meat; fish, poultry and game (other than live fish, live poultry and live game); meat pastes, fish products, poultry products and game products (all for food); fruits and vegetables, all being preserved, dried, cooked, bottled or canned; dairy products (for food), artificial cream, edible oils, edible fats; jam and marmalade; and jellies (for food). **Brian Jenks and Co., Ltd.,** Sabian House, 26-7, Cowcross Street, London, E.C.1.

**KEPS.**—753,028. Cocoa, chocolates, bonbons (confectionery), toffees, cake, rusks, biscuits (other than biscuits for animals), bread, flour, breadcrumbs, and frozen and flour confectionery. **Koninklijke Verkade Fabrieken N.V.,** Westzijde 103, Zaandam, Holland, and c/o Wildbore and Gibbons, 101, Leadenhall Street, London, E.C.3.

**MALTOOS.**—752,168. Non-medicated confectionery containing malt. **Clarnico, Ltd.,** The Confectionery Works, Waterden Road, London, E.15.

**MAMLAC.**—755,633. Animal foods with a milk base. **Dried Milk Products, Ltd.,** 40-42, Stoke Road, Guildford, Surrey.

**MELBRAY.**—744,218. Non-alcoholic drinks and preparations for making such drinks. **Melbray, Ltd.,** 158-162, Hurlingham Road, London, S.W.6.

**NUFRU.**—754,019. Flavourings (other than essential oils) for milk. **Potter and Sons,** 198, Crickdale Road, Swindon, Wilts.

**OSKA.**—755,329. Chocolate and non-medicated sugar confectionery. **A. S. Wilkin, Ltd.,** Cremona Park, Benton Road, Newcastle-on-Tyne.

**PENOCO.**—753,774. Chocolate and non-medicated confectionery. **Van Houten, Ltd.,** Chesham, Bucks.

**PEPCOL.**—754,291. Dog biscuits; and dog foods containing meat products. **Excelsior Products Co., Ltd.,** Epcol Mill, Stancliffe Street, Blackburn, Lancs.

**PESCODORA.**—754,814. Non-alcoholic essences and non-alcoholic extracts, none being essential oils, and all for use in making beverages. **Polak and Schwarz (England), Ltd.,** 50, Great Cambridge Road, Enfield, Middlesex.

**RUINART - CADET.**—732,668. Wines. **" La Bergerie " Société Vinicole du Baron Philippe de Rothschild,** 18, Rue Rabié, Pauillac, Gironde, France, and c/o Wildbore and Gibbons, 101, Leadenhall Street, London, E.C.3.

**SEMILKO.**—754,406. Milk and milk products (for food). **The Nestlé Co., Ltd.,** Hayes, Middlesex.

**SHER-BONS.**—752,936. Non-medicated boiled sugar confectionery. **R. Barnett and Co. Ltd.,** 53, Hartley Road, Nottingham.

**SUNFRESH.**—754,549. Non-alcoholic drinks and preparations for making such drinks, but not including fruit juices or non-alcoholic drinks containing fruit juices. **O. R. Groves, Ltd.,** 32, Shaftesbury Avenue, London, W.1.

*New patents are from the Journal of Patents and new trade marks are from the Trade Marks Journal. In each case permission to publish has been given by the Controller of Her Majesty's Stationery Office. Each of the publications is obtainable from the Patents Office, 25, Southampton Buildings, London, W.C.2.*

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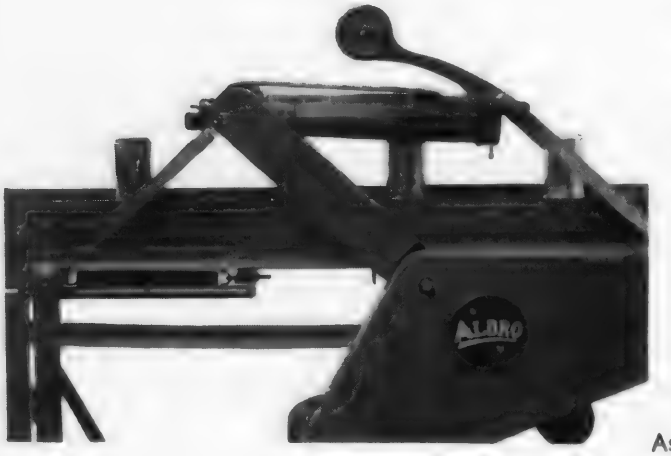


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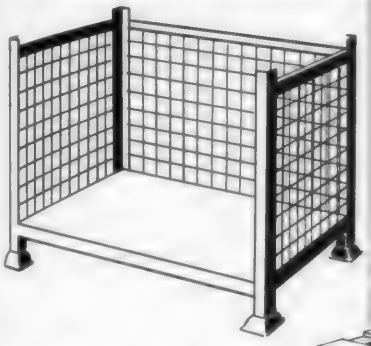
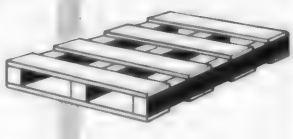
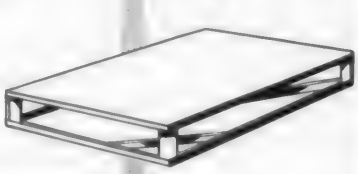


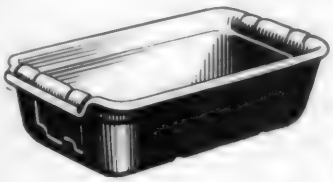
Cage type Stackable Pallets, suitable for cartoned foods, biscuits etc.



Flat Timber Pallets for handling and storing cartoned foodstuffs etc.



Flat Reversible Steel Pallets for handling cartoned foodstuffs, bottled or tinned foods etc.



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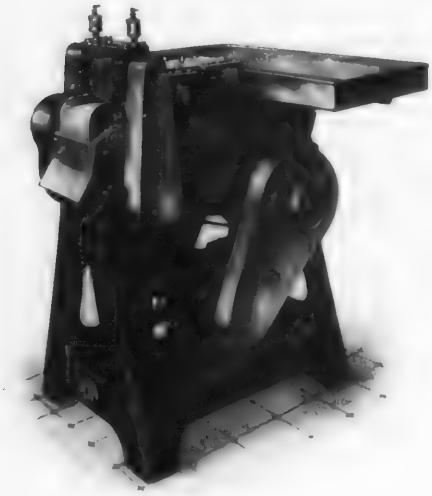

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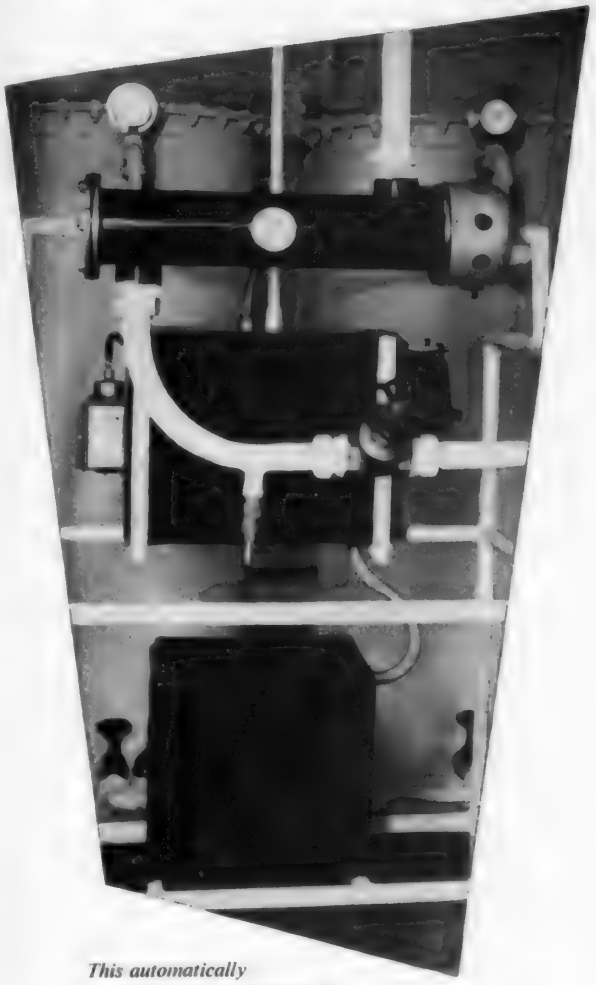

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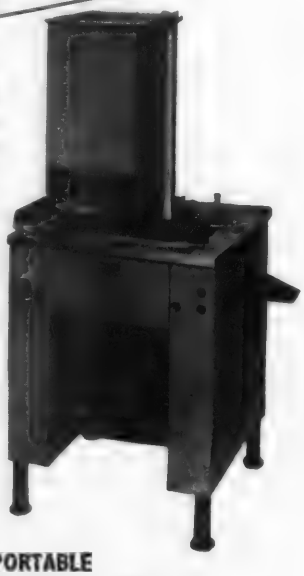

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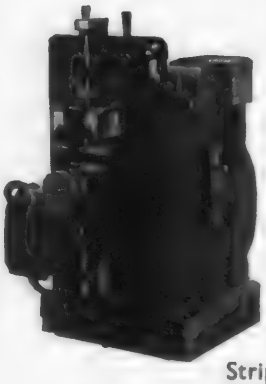

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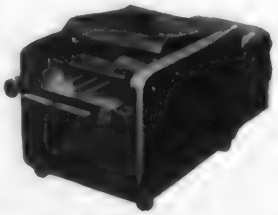

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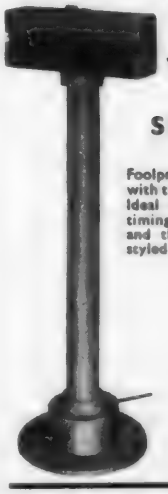

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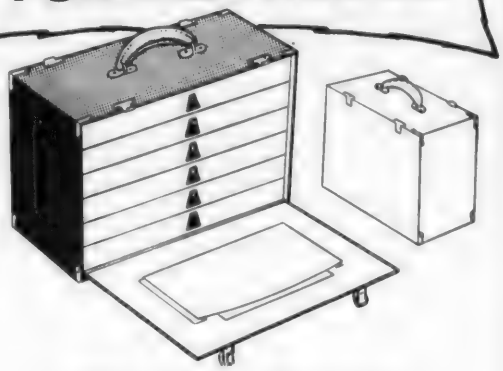

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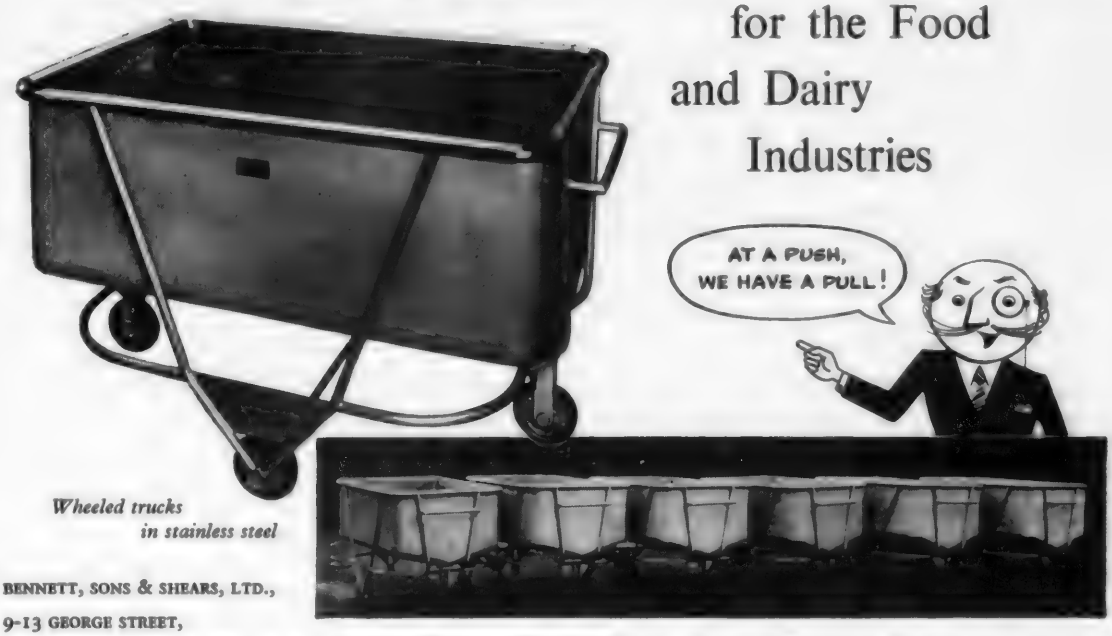


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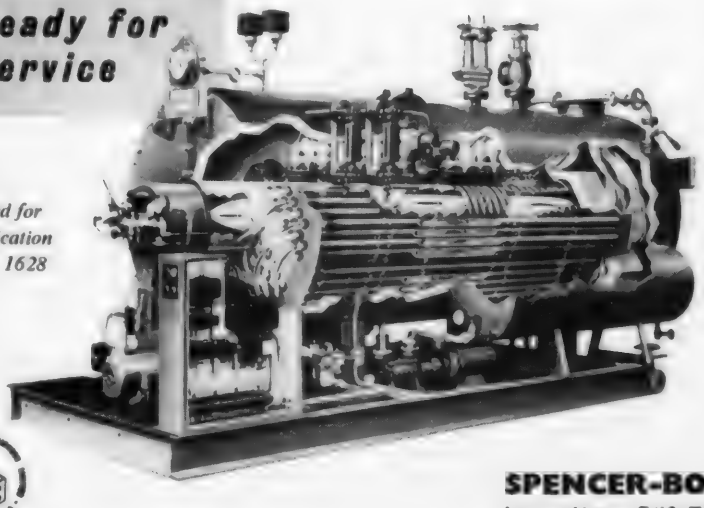

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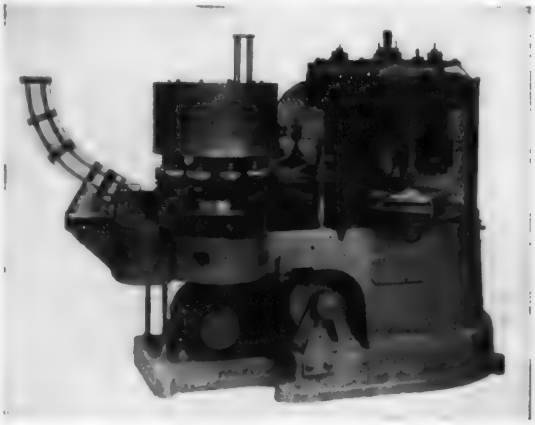

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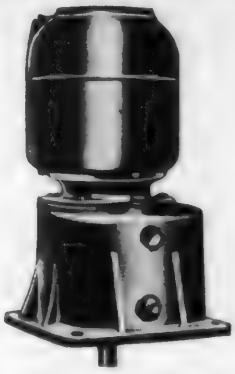

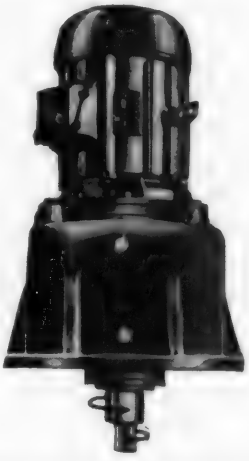

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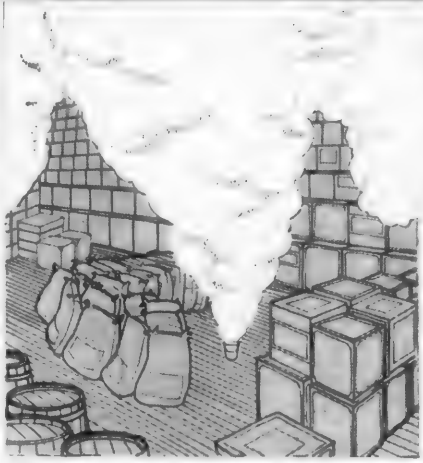

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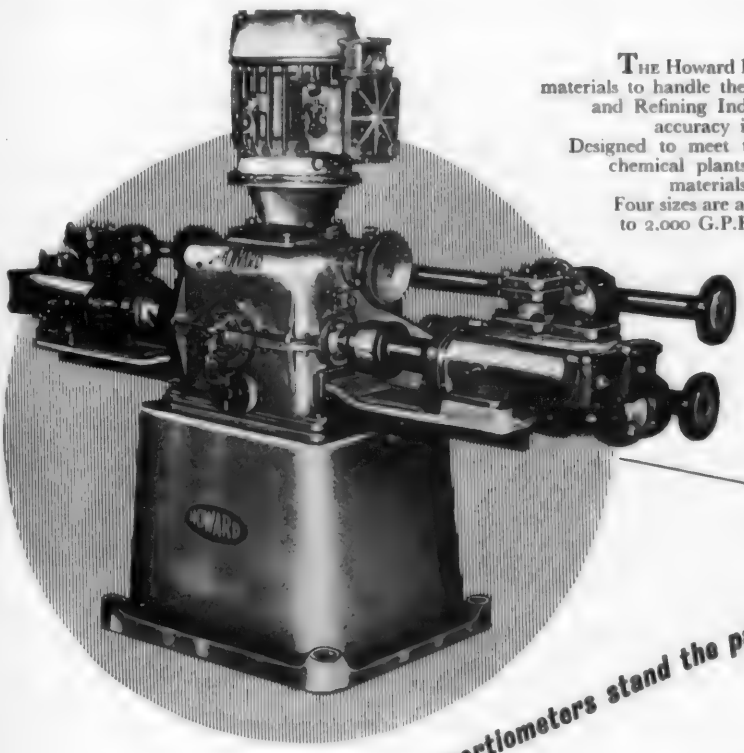


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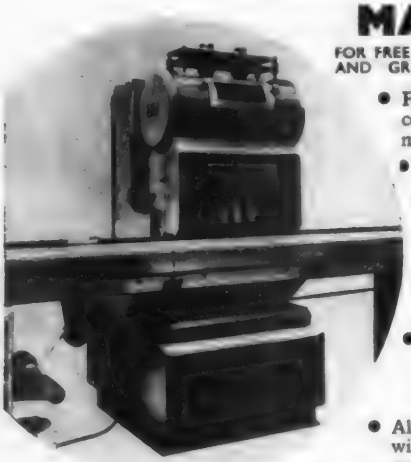

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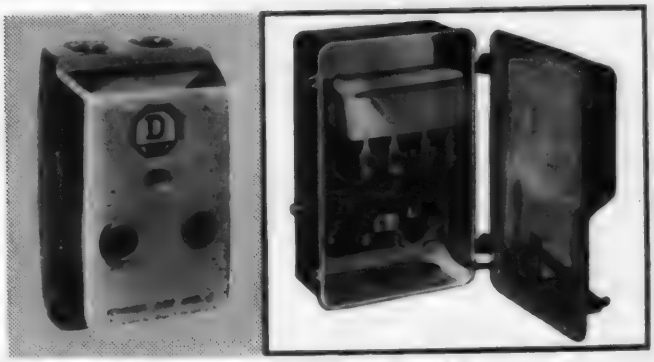

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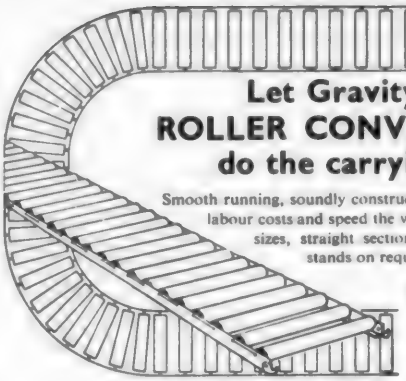

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**SENIOR** post available well-known British Company specialising food manufacture. Experienced Chemist required for development work. Good salary and prospects (with pension) for man with initiative. Sound knowledge of food processing, including milk, a strong recommendation.—Apply Box B5539.

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Box numbers, 1s. extra.

*Replies to*

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**J. SAINSBURY, LTD.**

Food Manufacturers and Distributors invite applications for the post of

**MANAGER**

**of Production Planning**

in their Food Factory at Blackfriars

Candidates should be between the age of 35 and 40 years, be educated to Higher National or equivalent level and have had practical experience of planning factory production preferably in the manufacturing of meat products but experience with other food products would be useful.

The commencing salary will be according to qualifications and experience—an applicant with adequate meat experience would commence at not less than £1,500 p.a.

The Post is permanent and pensionable.

Applications giving full particulars of age, education and experience should be addressed to:

The Personnel Manager (P.M.),
J. Sainsbury, Ltd.,
Stamford House, Stamford Street,
Blackfriars, S.E.1.

## SITUATIONS WANTED

**FOOD** Production Manager, Preserves, Canning, Pickle and Sauces, Puddings, etc., desires change. Process and Lab. control. Engineering, Plant and Line Production. Layout. Available from July 1.—Box B5530.

**EXPERT** Production Manager (37), fully conversant with all sides of Management of a Sausage, Pies and Cooked Meats factory seeks an opportunity to improve his position calling for initiative and scope in a large progressive factory. A practical man with drive, and holding full technical qualifications. Used to large-scale production under modern methods, costings, motion study, stock control, laboratory and staff engagements, etc. Personal history on application.—Box B5531.

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**TIME RECORDER RENTALS LTD.,** 157-159, Borough High Street, London, S.E.1. Tel.: HOP 2230.

**TO LET.** Cold Storage space for approximately 1,000 tons, at Lingfield, Surrey. Phone: IVER 287, or write Fruit Production and Storage (Lingfield) Ltd., Thorney Lane, Iver, Bucks.

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**DE-GREASING** and Cleaning Down. One man can do the work of five with B. and A. steam - cleaning - with - detergent equipment; ready for use from your own steam supply. " Speedylectric " high-efficiency steam lance; 30 ft. steam hose; 15 ft. detergent hose; £44 complete. Ideal for the Food industry.—Leaflet L.125 Hyzone Ltd., 2 Rosslyn Crescent, Harrow, Middlesex.

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**FOR** Sale, 25,000 Cans with Lids, size 211 × 108, packed in cartons, 50s. per 1,000.—Samuel Wilson, 61, Bow Street, Lisburn, Co. Antrim.

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Banks of Solid Drawn 8 gauge Green Band—1¼ in. nominal bore pipe six tube 6 in. centres by 30 ft. lengths complete hanging brackets. Suit large Cold Store. Approximately 12,000 ft. Fraction of cost — ALFRED'S ICES (1954) LTD., 3 Hall Place, Church Street, LONDON, W.2.

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**DRIED VEGETABLES**
**DRIED HERBS**
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**GROUND PAPRIKA**

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**AGRICULTURAL AND CHEMICAL PRODUCTS LTD.**
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**ESTABLISHED** manufacturers invite enquiries for: Genuine Worcestershire Sauce at 13/6 gal.; Excellent quality Fruit Sauce at 17/- gal. Packed 50-gal. casks, prices ex works.—Tamar Indien, Harders Road, Peckham, S.E.15.

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**STONE** Jars wanted to purchase. Any district.—Full particulars to T. Gunn (Rayleigh) Ltd., 206, London Road, Rayleigh, Essex. Tel.: Rayleigh 87.

**DAMAGED** or redundant stocks of food, residues or by-products in large or small quantities required.—Send your offers to Rotunda Foods Co., London Office: 50/52, Blandford Street, W.1. Tel.: Welbeck 8465.

**WE** are large buyers of: (1) Wooden Barrels; (2) Light Steel 40/50 gal. Drums.—The Liffey Cooperage Co., 6, Pim Street, Dublin.

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By Order of the Receiver
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*re* GIBSON BROS. (LIVERPOOL) LTD.
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**The Valuable**
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Central Canned Meat Factory and Garages 100 to 110, KEMPSTON STREET, and 86, GLOUCESTER PLACE respectively and the extensive Motorised Plant, Machinery, Equipment and Appliances of trade in individual lots (approx. 600) including: Stainless steel jacket Pans, stainless Meat Bogeys, Refrigerator Plant, Ham Cookers, two "Wetter" Fillers, Giant Mincing Machine by Wetter, Bone Saw, "Prestcold" Refrigerating Engine, several spare Electric Motors, Smiths Solder Bath by Moore, Birkenhead, a Danish Ham Press, two H. Sudry and Fils Ham Can Seaming Machines, a two-door Danish Vacuum Machine by Square Co., a Giant Vacuum Machine by Wm. Douglas and Sons, London, Vertical Vacuum Unit complete, Tables, Steel Racks and Tables, adjustable Can Washing Machine, Platform Scales, three Horizontal Pressure Retorts complete by Fraser and Son, Millwall, and I. Newton and Sons, Bradford, Vertical Water and Air Receiver, three-door Ham Retort, complete Refrigerator (deep freeze) 15 ft. by 9 ft. by 8 ft. 4 in., large quantity of stainless steel Ham Presses and Equipment, Pails, Trays, etc., and cast aluminium Equipment, Vats, Storage Tanks, two Blocking Machines, Auto Scales, Dough Rolling Machine, Rotax Cake Mixer by Hunt, Bolton, Mincing Machine, complete "Geryk" Vacuum Pump by Pulsometer Eng. Co., London, pair of Vertical Retorts by Thompson, Dudley, "Camwheat" Junior Pie Blocking Machine, "Tecalemit" Type 9 Pressure Pump and Cylinder, Can Washing Machine by Kelly, Dundee, Conveyor Belt, vertical all-steel Mechanical Can Conveyor by Metal Box Co., Worcester, a "Baughan" Overhead Moveable Crane, 10 cwt., G.E.C. Double Electric Baking Oven, a "Collins Handyman" Gas Roasting or Baking Oven and two "Bordo" ditto, Duratex Cake Mixer by Hunt, Bolton, steel cylindrical Bone Digester approximately 2 tons capcity complete (only 18 months old), nearly new Electric Goods Hoist by Landsmith, Crane and Co., Ramsbottom, 28 ft. by 5 ft. by 4 ft. with 14 cradles and 4 spares, large quantity of new Cardboard Cartons and new Cans and Lids, a "B.E.N." Patent Compressor No. AB3382 to 150 lb., "Globe" Ham Slicing Machine, Pressure Pumps, Saw Bench, Grinding Machine, "Myford" Lathe, stainless steel Pipes, self-feeding Vertical Boiler and "Prior" self stoker attached, large assortment of Accessories and Stores, Paper, 7 MOTOR DELIVERY VANS, and miscellaneous equipment, Office Furniture, Several Typewriters, Adding and Accounting Machines, etc.

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**ONE** 25 cwt. capacity Meal Mixer, floor loading model with drive at top—electric or tractor drive—almost new. One Christy and Norris No. 22 in. Disintegrating Mill—almost new. One Christy and Norris Sifting Plant No. 3—new. One Christy and Norris Vibrating Feeder new. One Industrial Waste No. 4 Centrifugal Fat Extractor with two baskets and trolleys—4 years old.—Offers for all or part to G. Brazil and Co. (Transport) Ltd., London Road, Amersham, Bucks.

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**FOOD** Laboratory Equipment for Sale, separate items or as whole. Consists of the following: Lovibond Tintometer. Microscope. Marconi Ph. Meter. Refractometer. Balance and Weights. Mixer with Variable Speeds. 80 Galenical Bottles. Retorts, Clamps, Burrettes. Pippetes. Lovibond Comparater. other sundries.—Box B5534.

**SMALL** complete Jam Unit for Sale, separate items or as whole. Consists of the following: Electrode Steam Boiler, 100 k.w. Three stainless steel Boiling Pans with copper base. Hewitt's self-tarring Scales. Round Turntable. Morton's Whipping Machine. Cutting or Mincing Machine. Hobarth-type Mixing and Mincing Machine. Two Rawson's Labellers. Stainless steel Pulping Machine. Clayton Washer. Steam Extraction Fan and Vent. Jam Thermometers. Four-hand Carrying Copper Pans. Buckets. Scales, etc.—Box B5533.

**250-GAL.** Stainless Steel Tanks. Benhil Butter and Margarine Packer. Stainless steel interior Milk Cooling or Cream Ripening Vat. Pasteuriser. Southall and Smith 2 lb. automatic Flour Weighing Machine. Mixers, Kneaders, Racks, Provers, Baking Sheets, etc. Your enquiries welcomed.—Sorensen Bakery Equipment Ltd., 42, Raby Street, Manchester, 16. Tel.: Moss Side 2054 and 4054. 'Grams: Rahbek.

**COLLIS** Staker. Manual hydraulic type. Capacity 5 cwt. Cable safety device. Lifts 117 in. Brand new. £130.—Box B5535.

**ROSE** Cellophane Wrapping Machines (two) for sale—for wrapping cartons in printed wax paper or cellophane with electric eye control, compressing device and motor drive; complete with canvas covers in each case. Will sell separately.—Box B5536.

**ELECTRIC** Pump. Brand new. By J. L. C. Engineering. Boiler feeding, suitable cold or hot water. 180°F., 100 g.p.h., 225 lb./sq. in. 1 in. suction and delivery. Fitted ¾ h.p. electric motor, 400 volts. £45.—Byprofood Ltd., Clopton, near Woodbridge, Suffolk.

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**JUNIOR** Bandsaw for Meat, also Heavy Duty Dicing Machine for Meat required.—Box B5526.

**JACKSON** and Crockatt (or similar) Twin Nozzle Paste Filling Machine required.—Box B5527.

**ONE** double trough jacketed Mixer, tilting device type, screw operated with twin "Z" blades. Glanded. Capacity 18/25 gal.—Box B5529.

**REQUIRED**. One or two "Hy-tra-lec" or Driver Weighing Machines for Crisps, with or without overhead or spiral vibratory conveyor.—Box B5528.

**STAINLESS** Steel Vats or Pots required, suitable, after adaption, for paint manufacture. Sizes 25 to 250 gal.—Denton Edwards Paints Ltd., Abbey Road, Barking.

**WANTED**

Diesel engines. Diesel generator sets. Any type surplus diesel plant. Immediate cash. We clear if required. P. R. Lowe and Co., 34a Rainham Road, London, N.W.10. Tel.: LAD 4005.

## SECOND-HAND PLANT FOR SALE

# 600

PLANT FOR THE MANUFACTURE OF MARGARINE

**FOUR** Horiz. stainless steel Blenders by Johnson, 5 ft. by 3 ft. by 3 ft. with welded steel jacket, bottom end outlet; split stainless steel lid with handles and two 10 in. diam. openings. Agitator of stainless steel tubular whisk type with glanded bearings, direct coupled to 2 h.p. Brook motor, 400/440/3/50, through Croft reduction gear, 1440 : 38. Jacket fitted thermometer pocket one end, bottom connections, and top overflow. 2,000 lb. working capacity.

2-ton capacity Chilling Unit by Hardaker, comprising stainless steel Chilling Machine direct expansion ammonia type, drum 4 ft. 6 in. face by 4 ft. diam., spray feed, doctor knife, etc. Drive by 8 h.p. tot. encl. motor, 400/440/3/50. Discharging to Portable Inclined Flat Belt Conveyor by Audley Engineering, 22 ft. centres with 18 in. wide balata belt. Thence to stainless steel Twin-screw Complector, working temp. 44·5°F., driven by 40 h.p. motor, 400/440/3/50, with 2 h.p. vacuum pump.

1-ton capacity Chilling Unit by Johnson, comprising m.s. Chilling Machine, drum 4 ft. 7 in. face by 2 ft. 10 in. diam., driven by 6 h.p. Brook motor, 400/3/50. Discharging to Portable Inclined Flat Belt Conveyor by Audley Engineering, 22 ft. centres with 18 in. wide balata belt. Thence to stainless steel Complector, details as for 2-ton plant.

Motor-driven stainless steel Emulsifying Pump by Hardaker, suitable for 1-ton chilling plant.

Bulk Packing Machine by Hardaker, fitted two cradles and wire cutting for 28 lb. and 56 lb. blocks, driven by 6 h.p. motor, 400/440/3/50.

Wrapping Machine by Benhill, Model 27, ¼ lb. capacity, speed 60 per minute.

Six jacketed Open Top Rectangular Vats by Harburger, 30 cwt. capacity, m.s. constr., 5 ft. 8 in. long by 3 ft. 7 in. wide by 3 ft. 2 in. deep, with side bottom 2 in. i.d. outlet, jacket suitable water and steam.

Two m.s. Open Top Cylindrical Dished Bottom Pans, 5 ft. diam. by 4 ft. deep, with 2 in. centre bottom outlet, and fitted split hinged lid.

Two stainless steel Agitated Mixers or Ageing Vats by Cherry Burrell, Model P. No. 124, approx. 3 ft. 8 in. diam. by 3 ft. 8 in. deep, vertical propellor agitator, supported from bridge across top. Vat insulated and fitted bottom side outlet.

Jacketed Tempering Kettle or Mixer, approx. 4 ft. by 4 ft. 2 in. deep, 1 ton capacity, riveted m.s. constr., fitted overdriven gate-type agitator driven from f. and l. pulleys. Side bottom outlet 2 in. i.d.

Six Portable aluminium alloy Open Top Tanks, approx. 7 ft. 9 in. long by 4 ft. 5 in. wide by 2 ft. 7½ in. deep, flanged top and fitted bottom end outlet 2 in. i.d. Vessel mounted on two iron castors with end castor pivot.

Six Portable aluminium alloy Open Top Tanks, approx. 7 ft. 9 in. long by 4 ft. 5 in. wide by 1 ft. 9½ in. deep, flanged top and fitted bottom end outlet 2 in. i.d. Vessel mounted on two iron castors with end castor pivot.

Complete Refrigerating Plant by Sterne, comprising Model 3U 4½, three cyl. ammonia compressor, vee rope driven by 35 h.p. Brook slipring motor, 400/440/3/50, with Erskine Heap oil immersed Stator rotor starter; shell and tube condenser, ammonia receiver, etc.

Complete Refrigerating Plant by Sterne, comprising Model 3W 7½, three-cyl. ammonia compressor, vee rope driven by 70 h.p. Crompton Parkinson slipring motor, 400/440/3/50, with Allen West oil immersed starter; induced draught condenser, receiver, etc.

*(continued in next column)*

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Gas-fired Boiler by Controlled Flame Boilers Ltd., type 6/H/S, No. 9688, tested 210 lb./sq. in.

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**PNEUMATIC** Scale Automatic High Speed Bottle Labelling Machine, for round, square or oval bottles, and capable of applying back and front bottle labels simultaneously at a speed of up to 120 bottles per minute. Complete with motor drive, feed conveyor and a quantity of unused spare parts. Reconditioned throughout.—Apply C. Skerman and Sons Ltd., 118, Putney Bridge Road, London, S.W.15. Tel.: Vandyke 2406.

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**THREE** Sinex electric Vibrator Screens, 7 ft. 6 in. by 2 ft. 6 in. Vertical enclosed 4 in. Bucket Belt Elevator, 25 ft. centres. Twin-feed electric Potato Crisping Machine. Hammamac Swing Hammer Grinding Mill; also Massey Harris and Fyna ditto with cylcones. 40-gal. copper-lined Steam Tilting Pans. Controlled flame, 3S, gas-fired Steam Boiler, 155 lb. evap., automatic feed; Brockhouse, 2-VS, ditto.—A. H. Kimmins and Sons Ltd., Lyndhurst Road, Worthing.

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**Vert.** five-roll Refining Mill by Buhler. Steel-cored rolls 31½ in. by 15 in. diam. Pulley drive. Vert. four-roll Refining Mill by Buhler, steel-cored rolls 29½ in. by 12 in. diam. Built-in hopper.

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Chilling Plant by Wm. Douglas. Rotating chilling drum, 61 in. face by 33 in. diam., cored for cooling, gear driven by 2 h.p. motor through reduction gear. Nicol patent texturator by Douglas, motorised. Circulating pump and Douglas Nicol atomiser.

Three twin-roll Drying Machines by Goudsche of Gouda, Holland. Fitted two steam heated rolls, 6 ft. 6 in. by 28 in. diam., for 80 lb. w.p. pulley drive. With accessories.

Twin cyl. steam-heated Drum Drier by H. Simon. Rolls 40 in. by 28 in. diam., 100 lb. w.p., running plain bearings with steam inlet and condensate outlet. Doctor knife to each roll.

10 cwt. rotary batch-type Drum Blender, by Sturtevant, 60 in. diam. by 32 in., fitted int. lifting flights. Motorised 400/3/50, through spur gearing and countershaft. Drum speed approx. 18 r.p.m.

Modern 80-qt. vert. Change Pan Mixer, by Peerless and Ericsson. Tinned steel bowl raised and lowered by handwheel. One light and one heavy whisk. Motorised 340/380/3/50.

5 cwt. Chocolate Kettle by Bartleet, 34 in. diam. by 20 in. deep, with 4 in. diam., bottom outlet. Gate-type agitator, motorised, 400/3/50. Water jacket with 4 kW. 230/250 v. immersion heater.

Copper Coating Pan by Baker Perkins, bowl 54 in. diam. by 22 in. deep. Riveted copper jacket, 15 in. deep. Belt drive.

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**S.S.LINED** twin blade jac. Mixers, 27 in. by 26 in. by 21 in. Two s.s. (unused) 100 gal. jac. Pans, 40 w.p. 42 in. "Manlove" Hydro, 400/3/50 (lift out basket). S.S.-lined Autoclaves, 6 ft. by 3 ft., 100 w.p.—Ditto, copper jac. " Peerless " Bowl Chopper and Mincer. " Peerless " 80 qt. Bowl Mixer, 3 h.p., 400/3/50, many smaller. " Manesty " Pelleting Machine. " Mather and Platt " 1 lb. and 2 lb. Jam Filling Machine. Hot Plates or Platens, 8 ft. by 4 ft., 10 ft. by 3 ft. and 11 ft. by 3 ft. 6 in. Thirty " Z " and fin blade Mixers. Twenty " U " trough Sifter/Mixers. Grinders, Crushers, Pumps, Pans, Tanks, Condensers, Ovens, Disintegrators, Fans, Steam and Diesel Plant, etc.—Harry H. Gardam and Co. Ltd.

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**Characteristics:** 1. Portable. 2. Stands on the bench. 3. ⅙ H.P. motor with trailing lead. 4. Easy to clean and service. 5. Swept volume: 1 cu.ft/min. 6. Vacuum ·01 M/M. 7. Pressure 10 lb/per square inch.

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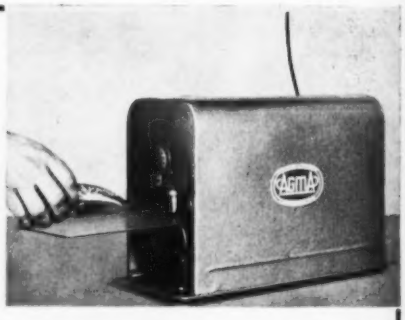


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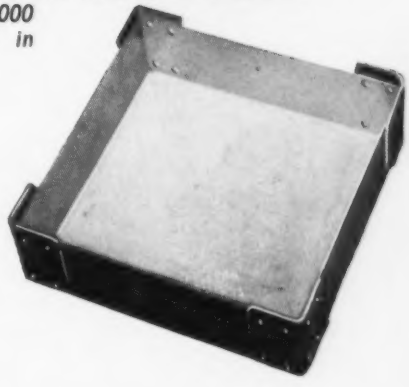
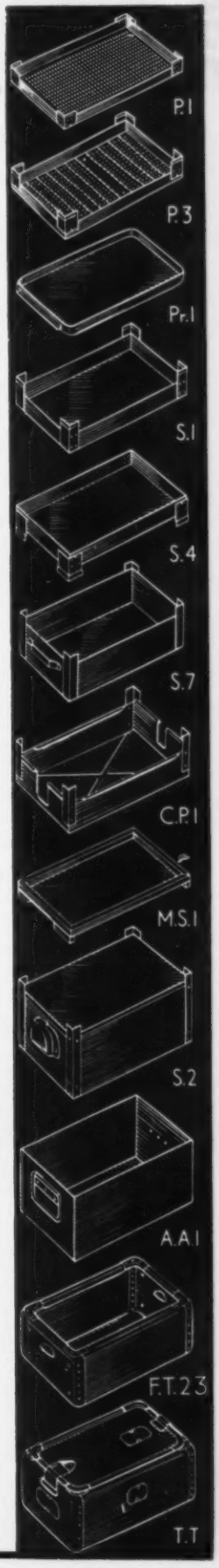


S.1 (Standard Corners).
Standard Interstacking tray, fitted with 10 S.W.G. corners, of general use where weight is moderate.




*Enquiries for fully illustrated literature and particulars from Dept. F.M.*

**PHŒNIX** *ALUMINIUM is the answer*

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